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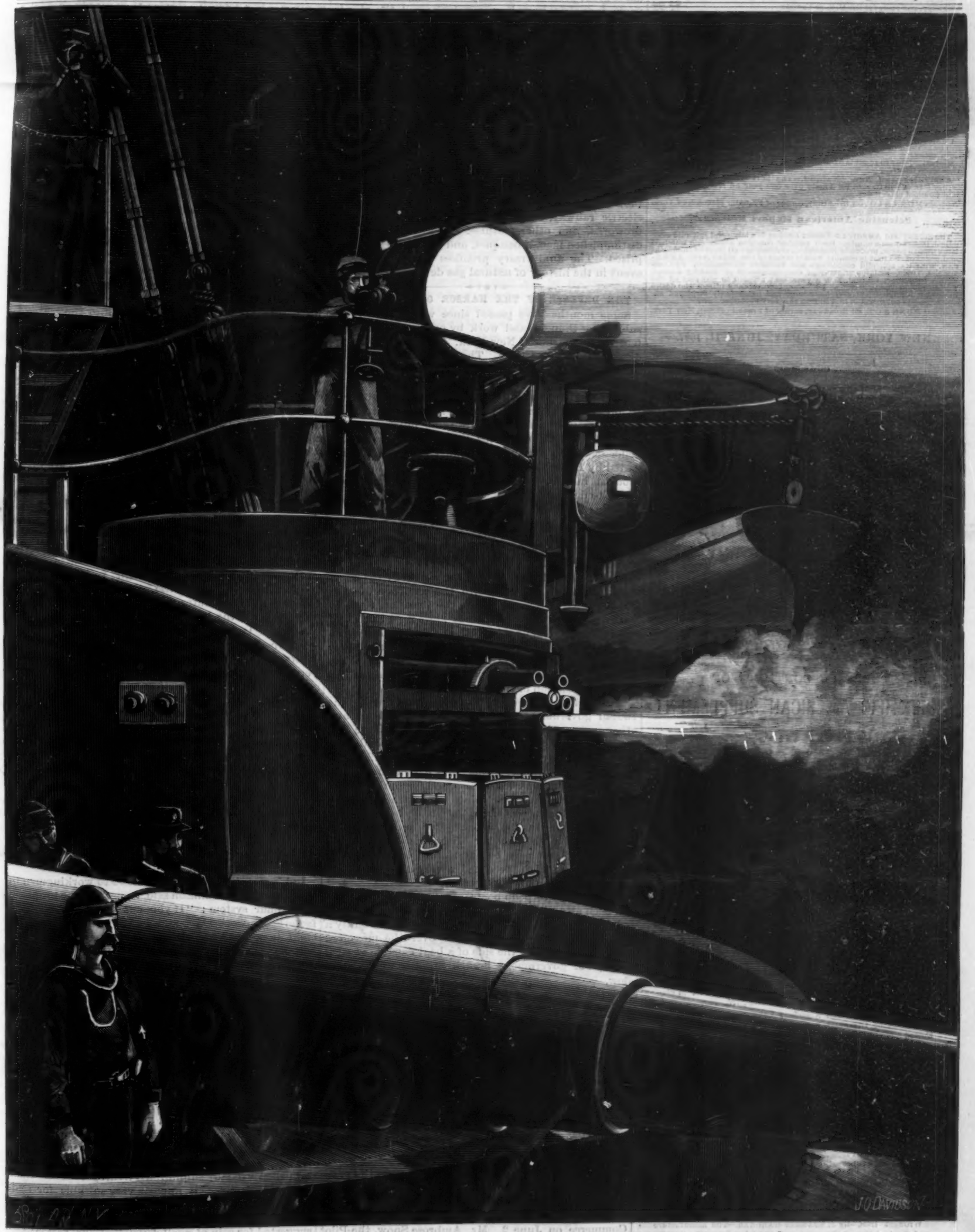

OUR NEW NAVY—SEARCH LIGHT ON THE U. S. CRUISER ATLANTA.—[See page 372.]

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NEW YORK, SATURDAY, JUNE 11, 1887.

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(Illustrated articles are marked with an asterisk.)

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SCIENTIFIC AMERICAN SUPPLEMENT

No. 597.

For the Week Ending June 11, 1887.

Price 10 cents. For sale by all newsdealers.

CELEBRATION OF THE ANNIVERSARY OF NATURAL GAS IN FINDLAY, O.

Natural gas in its minor manifestations has been known for many years, and has on the smaller scale been used for lighting since a very early period. But its application on the large scale to the arts as a perfect fuel is comparatively new. The honor of this achievement belongs distinctively to America. In its introduction to the glass house and steel works, it is correctly stated that a new era in the progress of the state and nation has been marked.

In its applications of natural gas to the arts, Ohio has made great progress. In that State and in Pennsylvania, industries have been revolutionized, the clouds of smoke from bituminous coal fires have melted away, and a new excellence of product has followed from the introduction of natural gas. The anniversary of its introduction into the city of Findlay being now at hand, the matter has been taken up by the city. With a view to celebrating this important epoch, the people of Findlay, through the Chamber of Commerce, have decided to commemorate the first anniversary of the practical application of natural gas to the mechanical arts in their city. The celebration is to be held on June 8, 9, 10, under the presidency of the Hon. William Vance. The programme is an extensive one. It includes the laying of corner stones of new industrial establishments, driving the silver spike on the Findlay electric railway, competitive drills, processions and fireworks, and other features. Speeches by various distinguished men, a banquet, and ball are also comprised. The anniversary promises to be a notable event in the history of natural gas development.

THE DEFENSE OF THE HARBOR OF NEW YORK.

Some months have passed since we suggested as a subject for thought and work by our readers the defense of the harbor of New York. The problem is, unquestionably, a live issue. The richest city of America is now defenseless and exposed to the attacks of any foreign power. Little or nothing could be done in the regular way to defend it. If the emergency arose, we would have to utilize the passenger and freight vessels which we now possess. With these much could be done. Pneumatic tubes for throwing dynamite torpedoes could be arranged on the ferry boats, as suggested by Lieut. Zalinski. Yet there is room for much thought in studying the application of our present means to defense.

Our weakness is in the want of means. Our navy is now in process of construction, or, at least, its foundations have been laid. In the naval science of the day, we have still much to learn of foreign nations. The science of sailing vessels is distinct from that of steamers. In old times we led the world by the superiority of our ships. But, with the abolition of sails and the introduction of steam, the situation tends to be reversed. Every week brings news from Europe of some triumph, real or imagined, in naval architecture. The day has come when the fighting vessel must have speed. This quality was never so essential as at the present day. The foreign powers show continually a fuller appreciation of the fact.

The recent purchase of the liner America by the Italian government, and the building for Italy and other powers of fast torpedo boats in the private ship yards of England, prove how much stress is laid upon the speed of war vessels. In ordering the building of vessels for our own navy, this point has not been overlooked, as premiums for excess and penalties for deficiency in this quality enter into the contracts. Gratifying as this action is, the question of how America actually stands in the capacity for producing fast ships may be a subject for serious investigation. A reasonable doubt may be entertained in the matter. Five years ago, high speed had a very different meaning from what it now possesses.

The speed of torpedo boats constructed in England has been attaining a higher standard each year. Every few weeks a new speed is chronicled, until recently a velocity of thirty miles an hour over the measured mile is claimed. By the side of a boat capable of such speed, our government launch Stiletto would seem slow.

Experience, and of a very costly kind, is required to arrive at the points necessarily followed in fast steamers. England is supplying the other powers with these vessels, and her builders are acquiring their skill and experience at the expense of foreign governments. But in case of war, their yards will be in the best possible condition to build the same vessels, or better, for their mother country.

The people of the United States have always proved themselves great in their power of rising to emergencies. They are not only inventive, but possess the power of inventing quickly. This power they may yet be called upon to exercise. It would seem better if they were allowed to begin now the attack upon the problem of the construction of fast ships of war.

In this connection a suggestion of great importance was made at the meeting of the New York Chamber of Commerce on June 2. Mr. Ambrose Snow, the Pilot Commissioner, proposed that the city authorities of New York and Brooklyn should unite in building a fleet of ten steam rams, to be used in case of necessity for the defense of New York harbor. When built, he proposed that they should be kept in reserve at the Navy Yard, and in case of necessity they could be manned by the crews of tug boats. There was much that is excellent in his suggestions. If the cities could find no authority for expenditures for such a purpose, our merchants, as a matter of insurance, could readily raise the necessary funds. The vessels once provided, the tug boat fleet would provide most competent sailors and engineers. These vessels, in their daily cruises, run many miles out to sea in the most tempestuous weather. For defensive service they supply as good a stock of material and school of seamen as did the whaling ships and bank fishermen in old times. If the patriotic merchants were to unite and build a successful fleet in short time, and if the vessels proved efficient, there is every probability that the United States would be glad to acquire possession of them as members of its new navy.

In the organization of such a scheme, and in designing the vessels, the enterprising business man and the inventor could work hand in hand. In this field the room for invention is unbounded, and the government could do no better service to the people than in encouraging every such movement as the one we have spoken of.

Hints to Swimmers.

"When the bathing season arrives," remarked a natatorium professor the other day, "we'll hear of the usual maximum of drowning cases, and among them, as usual, a fair share of expert swimmers. The chief reason why good swimmers are so often drowned when they are accidentally thrown into the water is because the shock causes them to lose their presence of mind. The loss of presence of mind leads to paralysis of body, or to such wild exertions as accelerate drowning, instead of contributing to preservation. The ability to behave wisely in case of sudden accidents can only be acquired by experience, just as everything else has to be acquired. The theory of the matter can be taught in swimming schools, but the practice must be acquired by experience. Hence, in some of the European swimming schools, says the *Hebrew Journal*, the pupils are taken out boat riding and purposely upset, as though the upsetting were accidental. They are also suddenly pushed overboard, and subjected to all manner of prepared accidents, so as to accustom them to acting in emergencies. In this way they learn how to behave in case of real accidents, and are protected against the loss of their presence of mind on occasions of danger on the water. They are also taught to have faith in the sustaining power of the water itself. They get to know that the water will sustain them if they will only render it the least help.

A finger laid upon an oar, or the gunwale of an overturned boat, or a board, or almost any floating substance, will sustain the human body in calm water. Persons who have been properly taught, and have acquired the habit of acting with self-possession in the water when they are upset, do not attempt to climb upon the overturned boat, but simply take hold of it and quietly support themselves. A boat half filled with water, or completely overturned, will support as many persons as can get their hands upon the gunwale, if they behave quietly. In a case of accident, a person who understands and acts in accordance with these facts would stand a better chance of being saved, even if he were a poor swimmer, than an expert swimmer would stand who should lose his presence of mind.

Eight Hours a Day.

In his recent very sensible address to workingmen in Boston, Edward Atkinson said, respecting the proposed eight hour system: "If you cut down the work in factories, in workshops, and in the building trades to eight hours, you cut down the product. Then there will be fewer goods, fewer stores, fewer tools, fewer houses, and that means a higher price and higher rent." This is the doctrine that has been steadfastly preached in our columns for years past. The proposition to try to make men richer by reducing the hours of labor, and so reducing the amount of wealth created, is as stupid as would be a scheme for enlarging a water power by cutting down the mill dam.—*Textile Record.*

Aluminum-Silver Alloy.

Alloyed with a small per cent of silver, aluminum loses much of its malleability, but with 5 per cent of silver it can be worked well, and takes a more beautiful polish than the pure metal. With 3 per cent of silver it is very suitable for philosophical instruments, being harder and whiter than the pure metal, and is not tarnished even by sulphureted hydrogen. With small amounts of silver, it appears very suitable for scale beams, and is now frequently used for this purpose. The alloy containing 5 per cent of silver has often been suggested for coin of small denominations, as it is hard, bright, and retains its luster in handling.

PHOTOGRAPHIC NOTES.

Improved Distance Measurer.—At a meeting of the Photographic Society of France, M. Lemercier exhibited a novel attachment to a camera, for quickly ascertaining how far objects were from the camera. The device consisted of a V-shaped jaw on an acute angle placed horizontally on the front portion of the top of the camera, and connected by a system of levers to the lens, so arranged that when the lens is drawn in or out for focusing, it will automatically open or close the jaws.

If an object is 200 feet distant, the lens is moved until an accurate focus is obtained, and a corresponding mark is made on the jaws. When the ground glass is removed, focus is obtained by operating the lens until the object can be plainly seen between the jaws at the 200 feet mark. Other marks for different distances are made on the jaws. A peculiar advantage of the device is that it enables one to determine how *far off* a man is from the camera. If, when the jaws are wide open, the head and feet are just included in the space between the outer extremities of the jaws, then the man will be ten yards distant. If his image be so small as to come within a mark near the apex of the jaws, then he will be 200 feet distant. The operator stands behind the camera, and looks through and against the side of the jaws.

Diffusing Light in Studios.—Frequently there is need of diffusing light in studios, either from the direct rays of the sun or from the reflection of colored light from high buildings. Waxed tissue paper has been found to be one of the best mediums for this purpose, since it allows a large percentage of light to pass, and at the same time it is the latter is equally diffused. Pictures may be made as quickly as if there was no medium interposed. Thus we have a new use for waxed paper, in the manufacture of photographic screens.

Removing Pyro Stains from the Fingers.—The *British Journal of Photography* says this is easily done by moistening the hands with a dilute solution of almost any acid—hydrochloric, nitric, oxalic, citric, etc. After cleansing in this manner, the hands must be freely washed in hot water. If this precaution is not taken, the stains will reappear under the use of soap and water.

Something New about Bees.

At a recent meeting of the Royal Microscopical Society, Mr. F. R. Cheshire called attention to some specimens of bees, known as "fertile workers." It was generally well known that in the beehive all the eggs were usually laid by the queen, and in her absence no ovipositing occurs until they have taken some of the eggs remaining in the hive, and by a special feeding of the larvæ have been able to produce fresh queens. If, however, it should happen that in a hive which has lost its queen there are not eggs available for this purpose, it was found that some of the workers under some special circumstances, which could not be very clearly explained, became capable of laying eggs, but that such eggs produced drones only. These bees were known as fertile workers, and though there could be no doubt as to their frequent existence, they were very difficult to catch, owing to their being the same in appearance as the ordinary workers. He now exhibited two of these fertile workers having the ovaries drawn out of the bodies, and attached to the stings and abdominal plates, so as to show that they really were workers. There was a remarkable peculiarity to be observed in connection with the ovarian tubes of these insects—every ordinary worker possessed an undeveloped ovary which it was very difficult both to detect and dissect; but when under the influence of some stimulus the worker became fertile, a number of points began to appear in the tubes which afterward became developed, and it would seem that the eggs were developed in alternation, an examination of the tubes showing them to contain developed eggs alternating with others in an undeveloped condition, and of which some very curious instances were seen in the specimens before the meeting.

"The Spectacle Mission."

A provincial contemporary contains an account of a new missionary enterprise—one for distributing spectacles among the poor. This may seem at first sight a very prosaic thing to do, but we recognize in it the very genius of kindness. "I was eyes to the blind" was one of the most excusable boasts of Job in his moments of pardonable complacency. Such may be the satisfaction of Dr. Edward Waring, of Maida Vale, who is credited with initiating this piece of benevolence among the inmates of St. Giles' Workhouse and the Cleveland Street Sick Asylum years ago. Such a service implies much trouble and time. It is of little use to supply spectacles to the poor without much personal trouble to suit the glasses to sight. We can only hope that Dr. Waring's example will be fruitful, and that the intolerable irksomeness of life in those who have the disposition to work without the means of doing so will be extensively mitigated.—*Lancet.*

A Curious Explosion.*

A few weeks ago we had a curious explosion here, which is, I think, worthy of record, in order that similar occurrences may be guarded against in future. What exploded was a steel cylinder which was being charged with oxygen gas in the basement of the School of Science building. It was one of the so-called forty-foot cylinders made by the New York Calcium Light Company, and was intended to be charged to a pressure of fifteen atmospheres. It had been regularly used at that pressure for a year or two. At the time of the explosion the pressure was only about ninety pounds, as shown by a pressure-gauge connected with the apparatus. This gauge had been duly tested only a week or two before, and found correct. The oxygen was being pumped into the cylinder from the gasometer by an ordinary force-pump, furnished for the purpose by the makers of the cylinder, and driven by steam power at the rate of about eighty strokes per minute. The lower portion of the cylinder was immersed in a vessel of water, to keep it cool; and the pump piston was lubricated with a heavy mineral oil, such as we are accustomed to use in the steam engine cylinder. The seat of the lower valve is of hard rubber, and had just been faced off, so that the pump was in exceptionally good order, and working very effectively. The connection between the pump and cylinder was by a heavy lead pipe of about a quarter-inch bore, and about five feet long.

At the time of the explosion two persons were in attendance, one of them Mr. Fisher, the mechanician of the School of Science, in charge of the machine shop, who stood by the pump watching the pressure-gauge; and the other his assistant, standing by the cylinder itself. Suddenly a flame, blue or green, and some three or four inches long, made its appearance on the top of the cylinder, where the lead pipe was coupled to the stop-cock. The young man at once reached out with his hand to turn the wrench (which was in its place, on the top of the cylinder), in order to prevent any loss of gas; at the same time naturally turning half round away from the cylinder, stooping a little. Before he could turn the wrench, the thing exploded, with the noise of a six pounder gun. The cylinder tore in two about six inches from the bottom. The upper part flew up, striking the floor of the mineralogical cabinet above, giving such a blow as moved some of the cases several inches, and shook the specimens completely into *pi*. The glass of every window in the basement was blown out, the plastering was knocked down, and the whole establisment was pretty thoroughly wrecked. Strange to say, neither of the men was much hurt. Mr. Fisher had his eyebrows singed, and a piece of the cylinder nearly as large as one's hand was shot through the brim of his hat, passing within an inch of his forehead. The assistant was sent flying, head first, nearly twenty feet, against the gasometer tank. Of course, he was a good deal bruised and shaken, but fortunately not seriously injured, not enough to confine him to his room even for a single day.

Somewhat similar explosions, but much less violent, had occurred two or three times before, always in charging the *oxygen* cylinder; but the damage done had never been anything more than blowing off the lead tube from its connections, or bursting it. I learn also that something of the same sort is not quite unknown in the pumping rooms of the establishments which deal with the gases on a large scale.

Now, as to the explanation. My theory is this, and several eminent chemists and physicists to whom it has been proposed accept it, while none, so far as I know, reject it. The explosion was probably due to the *firing of oil spray, and possibly a little oil vapor* mixed with the oxygen gas. The inside of the cylinder after the explosion was found to be covered by a film of oil, which undoubtedly came from the pump cylinder, and was forced into the pipe along with the gas; a little puff of gas and oil spray passing through the valve at each stroke of the piston.

Now, oil in pure oxygen will, of course, burn with extreme violence and the evolution of great heat, if anything sets it on fire; and though the immediate effect of such firing might not be an explosion quite in the sense of an explosion of gunpowder or dynamite, yet it is certain that the sudden and intense heating of the gas in the cylinder would immediately raise the pressure, already ninety pounds by the gauge, to three hundred or four hundred pounds, and quite beyond the strength of the metal. The fact that the young man was not torn to pieces, but simply pushed and thrown, corresponds to an explosion of the kind indicated. At the same time, the fact that the hand with which he tried to turn the wrench was slightly singed, shows that *fire* was present. It was not merely a case of a cylinder weakened by age and rust bursting under a pressure it ought to be able to bear.

The firing of the mixture of oil and gas was unquestionably due to the sudden pressure produced at the lower valve of the pump by each piston stroke. It will be remembered that the seat of this valve was of vulcanite, a very poor conductor of heat; so that, although the bottom of the cylinder was kept fairly cool by the vessel of water in which it was immersed, yet there was nothing to prevent the gas itself, just at the valve, from becoming very hot, and even rising above the temperature of ignition, if at any time, during a stroke or two, the valve happened to stick a little.

The moral is simply this: Do not lubricate an oxygen pump with *oil*, but with *soap suds* or something that will not burn in oxygen.

* By Professor C. A. Young, in *Popular Science News.*

Killed by an Orange Seed.

Henry Chatfield, of 115 Henry Street, Brooklyn, the head of the hosiery department of a Fulton Street notion store, died May 29 of the effect of the lodgment of an orange seed in his intestines. He had been ill for several weeks with inflammation of the intestines, followed by ulceration. Dr. Emerson, his physician, called in Dr. William Gilfillan for consultation, and they, having decided that an operation was necessary, procured the assistance of Dr. F. H. Colton. On the morning of May 29 the three doctors made an incision, and after removing a quantity of pus found the source of trouble and removed it. The patient, however, was unable to rally from the shock, and died about 4 o'clock. Dr. Gilfillan said:

"The operation was a desperate one, and was undertaken only as a last resort. There was no possibility of saving the patient otherwise. The orange seed was found lodged in the appendix vermiformis. This is a small sac that is attached to one part of the intestines. What purpose it serves is not exactly known. It is, however, a sort of trap, always ready to catch and hold hard substances passing through the intestines. The lodgment of such substances in it is not invariably fatal, but the exceptions are rare. Seeds of oranges, rasins, and similar fruits are peculiarly liable to be caught in this way. Is it dangerous to eat oranges? Well, I suppose in a city of this size there is one case a year of death from such a cause. Very frequently it is an orange seed, but not always. There are about 600,000 people in Brooklyn, all eating oranges right along, and with one death a year from this cause it would seem to be about as dangerous to eat an orange as to sit in the house and wait for a stray pistol ball to kill you. Still, it's just as safe, and a good deal nicer, not to swallow the seeds when you eat oranges."—*N. Y. Sun.*

Influence of the Degree of Rarefaction on the Efficiency of an Incandescent Lamp.

In the manufacture of lamps, the photometric researches by Sig. Heess, applied to some Swan lamps where the rarefaction of the gas was made to vary from a maximum obtainable with a mercurial air pump down to 2 mm. (10-125 inch) by a mercury gauge, are of much interest. It was ascertained that naturally the illuminating power for a given quantity of electric energy was highest when the highest vacuum obtainable was produced. As the pressure was allowed to increase, the light diminished; but at first the decrease was slight, so that the luminous intensity was nearly equal to the maximum value until the pressure exceeded 3 mm. (10-125 inch). Increasing the pressure beyond this point, the luminous intensity rapidly decreased, until it became reduced to two-thirds of its original value, when the pressure increased from 2 to 6 mm. (¼ inch).

Sig. Heess concludes that to obtain from a lamp a good luminous efficiency, the tension of the gas should not exceed 2 mm. The author notes that while the experiments were conducted with the Swan lamp, it is probable that the results would apply to lamps of other types. In any case, the result of these experiments should be placed on record, because in judging of the expediency of pushing the exhaustion of an incandescent lamp to certain limits, not only the luminous efficiency, but other circumstances also, have to be taken into consideration.—*G. G., in L'Industria.*

Deaths of Eminent Foreign Medical and Scientific Men.

The deaths of the following foreign medical and scientific men are announced: Dr. W. Hack, Professor of Laryngology and Dermatology in the University of Freiburg in Baden, was recently found dead, apparently from heart disease, upon his tricycle, which was standing in the middle of the road near Staufen in the Untermunsterthal.—Dr. Max Geminger, Conservator of the Munich Zoological Museum, and a well-known entomologist.—Dr. Joseph Lerch, Extraordinary Professor of Zoology and Director of the Zoo-chemical Institute in the German University of Prague.—Dr. Vladimir T. Horschelmann, Privy Councilor, and late holder of a high position in the St. Petersburg district, Military Medical Staff. At the time of the Crimean war he was senior surgeon of the Preobrashenski Regiment.—Dr. Edward Meyer, who is described as the Nestor of Livonian practitioners, being at the time of his death eighty-two years of age, and having taken the M.D. degree at Dorpat in 1827.—Dr. Hellinger, one of the oldest and most respected medical officials in the Rhine provinces.—*Lancet.*

SMOKING PIPE.

The bowl of the pipe communicates through openings in the bottom with a chamber having a suitable outlet, which can be located at any desired point on the bowl or stem. The opening through the stem terminates in this chamber. It is evident that, by blowing through the stem, a powerful current of air will be drawn down through the tobacco in the bowl and the smoke will be forced through the outlet. It is impossible for either the smoke or nicotine to enter the mouth, and there is no danger of the pipe becoming clogged. The strongest tobacco can be smoked by a person not at all accustomed to it. The smoke can be blown out at any point of the pipe, either the head or stem, for fumigating purposes. A more uniform draught, and one which can be continued for a longer time, is possible with a forced blast through the stem, as in this pipe, than with the inward draught of an ordinary pipe. This construction can be applied to any pipe or holder made specially for it, or it can attached to the ordinary forms of smoking devices.

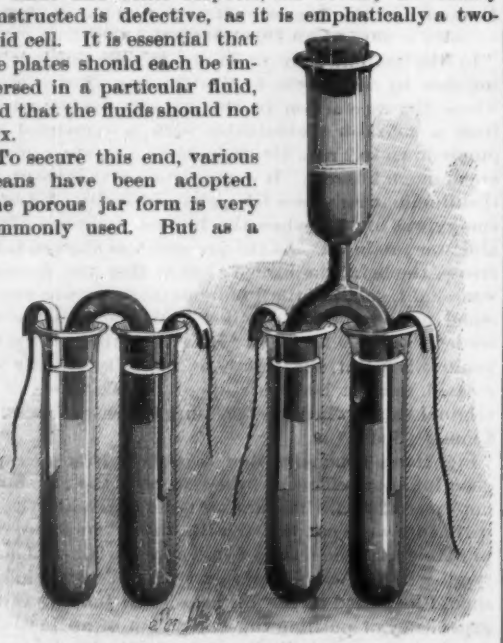
This invention has been patented by Mr. Henry G. Schramm, of Camden, N. J., who will furnish any further particulars.

STANDARD DANIELL'S BATTERY.

T. O'CONOR SLOANE, PH.D.

The sulphate of copper battery is probably more used as a standard of electromotive force than any other. Various forms have been suggested and adopted. Among the features to be secured are permanency and freedom from tendency to local action. In these and other respects, the battery as usually constructed is defective, as it is emphatically a two-fluid cell. It is essential that the plates should each be immersed in a particular fluid, and that the fluids should not mix.

To secure this end, various means have been adopted. The porous jar form is very commonly used. But as a scientific apparatus this is defective. The pores of the jar become filled with the battery salts, and to start new this may require quite a lengthy process of cleaning. Then it sometimes happens that metallic copper precipitates upon the surface of the porous jar, rendering it quite *hors de combat*. Thus the mere fact of the use of such a jar introduces an element of complication.



STANDARD DANIELL'S BATTERY.

In the cut is illustrated a very simple and cheap form of cell that avoids most of the troubles usually affecting Daniell's battery. Two forms are shown, one of the simplest possible description, the other a modification designed to secure lower resistance, and admitting of the convenient use of a septum of gold beater's skin or other membrane.

The simpler form is constructed with two test tubes, a small bent glass tube, and the plates and solutions. Two test tubes are placed in a stand. A piece of glass tubing is bent in a smooth curve, so that when in place it will extend from one to the other, as shown. This should be about 3 mm. (⅛ inch) in internal diameter. A piece of copper for negative plate, and of zinc for positive plate, are provided. To each a wire is connected by soldering. The desired solutions must now be prepared. The strength is of course to be fixed by the experimenter, according to the results he wishes to obtain from the battery.

The use of saturated solutions is very usual. Assuming such to be employed, one of the test tubes is nearly filled with a saturated solution of copper sulphate. The other one contains a saturated solution of zinc sulphate. The latter is the heavier fluid. The bent tube is now filled with the same solution of zinc sulphate. If it be held while thus filled with its two open ends down and open, it will not empty itself. The least jar or shake will cause it to do so; but by careful handling it can thus be carried from one vessel to another. Having then filled it with the solution, which is easily done by siphoning, it is carefully lifted up as described, and lowered into the solutions in the test tube. To be sure that no air bubbles rise into the bend, it is well to have the zinc sulphate tube filled to the higher level. Then, on introducing the bent tube, a little of the zinc solution will first siphon over and sink to the bottom of the copper solution. A slight mixing of the solutions is not prejudicial, provided no copper solution comes in contact with the zinc plate. The bent tube having thus been introduced, the copper plate is placed in the test tube containing copper sulphate solution, the zinc plate in the other tube, and the battery is ready for use.

It is of extremely high resistance, and no porous septum is used to secure more perfectly from mixture. A slight mixing of the solutions in setting up, moreover, cannot well be avoided. The other form overcomes these troubles, and also gives a cell of lower resistance. The bent tube is made of larger diameter. It may be nearly as large as the test tubes. To the apex of its bend a capillary tube, opening into a large tube, is connected. If desired, a septum may be tied over one of its lower ends. The tubes are filled with their solutions, the bent tube is placed in position, and by suction the liquid is drawn up until it rises through the capillary tube, well into the larger one. The suction is stopped and the end left free. The liquid naturally sinks, but, owing to the small size of the capillary tube, with such slowness that a cork can be inserted, without trouble, into the suction tube. The plates are put into their places, and all is ready for use.

If a piece of membrance is used, it should be tied over the end of the tube which is immersed in the solution of higher specific gravity, containing the sulphate of zinc. It is well also, in this case, to pour into that limb through the suction tube a quantity of the zinc sulphate solution. The level of liquid in the test tubes and the length of the straight portions of the bent tubes must be so adjusted that enough liquid will be left in the test tubes after the filling of the connecting tube. To make this easier to effect, it is well to use test tubes of large diameter, or even small beaker glasses.

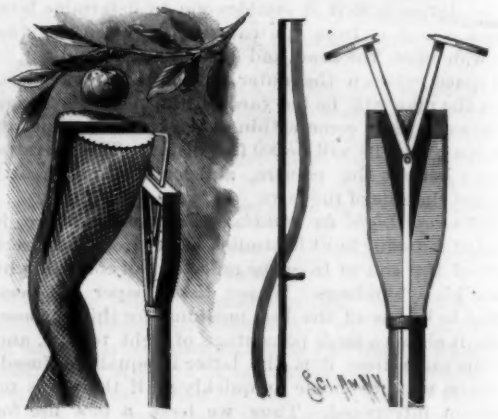
Nearly Thirty-three and a Half Miles per Hour.

Messrs. Thornycroft, of Chiswick, have just completed a new torpedo boat for the Spanish government which for speed, it is stated, has beaten anything that has yet been built. The new boat is 147 feet 6 inches in length, has a beam of 14 feet 6 inches, and draws 4 feet 8 inches of water. She has two tubular boilers and twin screw compound engines, which act independently of each other, while the steering gear consists of two curved rudders, which make her extremely handy, as she is able to turn about in three times her own length, going at ordinary speed, which, at a trial on May 10, was 15·84 knots with the natural draught. On a recent trip with the tide in her favor and forced draught, she is said to have attained the extraordinary speed of 29·01 knots, or a rate of nearly 33½ miles an hour. Her times on May 10 on the measured knot were, for two runs of a knot each, with the tide, 2 minutes 10 seconds and 2 minutes 11¼ seconds, while against the tide, for three runs, the record was 2·35, 2·35, and 2·35⅕, giving a mean speed of 26·18 knots, or over 30 miles an hour.

The boat is divided into a number of watertight compartments, and in case of being hulled by shot is fitted with ejectors capable of discharging 480 tons of water per hour. She has two torpedo tubes in the bows, and has space to carry four Schwartzkopf torpedoes, and will mount four Nordenfelt machine guns.—*Iron.*

FRUIT GATHERER.

By means of this light and portable device, the fruit may be harvested without injury to either tree or fruit, and any known fruit may be brought from the top of a tree to the ground or hand of the operator in a perfect condition. The upper end of a hard light wood pole is constructed with flat sides and edges. Centrally, upon one side of the pole, is a groove, in which slides an iron or steel rod, pivoted to the upper end of which are short arms whose free ends are united to semicircular cutting plates. The straight edge of one of the plates is formed with a cutting edge, while the straight edge of the other plate is provided with an angular groove to receive the cutting edge. A wrought iron cap having a central triangular cross piece is fitted over the end of the pole, to serve as a guide to the short arms and as a brace and stay for the upper portion of the pole. A tube of canvas or cotton, about three or four feet longer than the pole, open at its lower end and slitted a short distance at its upper end, is secured to the semicircular plates. This tube receives and conducts the fruit to the ground or hand of the operator. To use the gatherer, the cutting plates are closed and it is hoisted up among the branches. When near the fruit, the operator inserts the offset of a detachable handle in the most convenient slot in the sliding rod, and, by means of the handle, pushes the rod upward, thereby causing the pivoted arms carrying the cutting plates and the flexible tube to extend upward and outward above the end of the pole. The fruit is thus covered within the outstretched cutting plates and tube, and, upon the handle being drawn downward, the stem is cut by the plates as they come together. The fruit is then conducted by the tube gently to the ground.

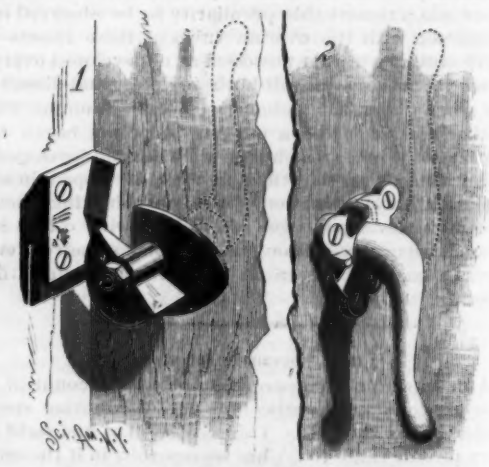


EVANS' FRUIT GATHERER.

This invention has been patented by Mr. Eugene E. Evans, of Crystal Springs, Miss.

IMPROVED DOOR SECURER.

This door fastener is specially adapted for use with refrigerator and ice house doors, which under all conditions are brought by it up tight to the jamb. To the outside of the door, Fig. 2, is attached a plate, and upon the inside, Fig. 1, is held a second plate, these plates being shaped as shown in the engraving. A square spindle formed with a handle at one end, and having a thread at the other, passes through the plates and door. Upon the inner end of the spindle is placed a segmental block having opposite cam faces and formed with a square opening to receive the spindle, the block being held by a nut screwed upon the spindle. To the inner face of the jamb is secured a plate having a narrow right-angled projection, the outer face of which is inclined in opposite directions from the center, the plate being sc held that one of its inclined surfaces will engage one face at the reduced end of the block when the latter is carried from a vertical to a horizontal position. The block is made with a double face and the plate with a double inclined surface, so that the device may be used either right or left, as found most convenient. In operation, when the door is open, a lug upon the handle rests upon a horizontal lug on the plate on the outside of the door, the handle and block being in a horizontal position facing the inner edge of the door. When the handle and consequently the block are carried to a vertical position, the door can be closed; and then if the handle be carried downward in the direction of the inner edge of the door, the reduced end of the cam will engage the inclined face of the plate, and the farther the handle is carried down, the tighter the door will be pressed against the jamb. Ordinarily, the handle need only be carried to a horizontal position to effect a tight joint; but a full quarter turn more may be made if the door is badly shrunk or warped. The fastening is secure when made, and easily released.



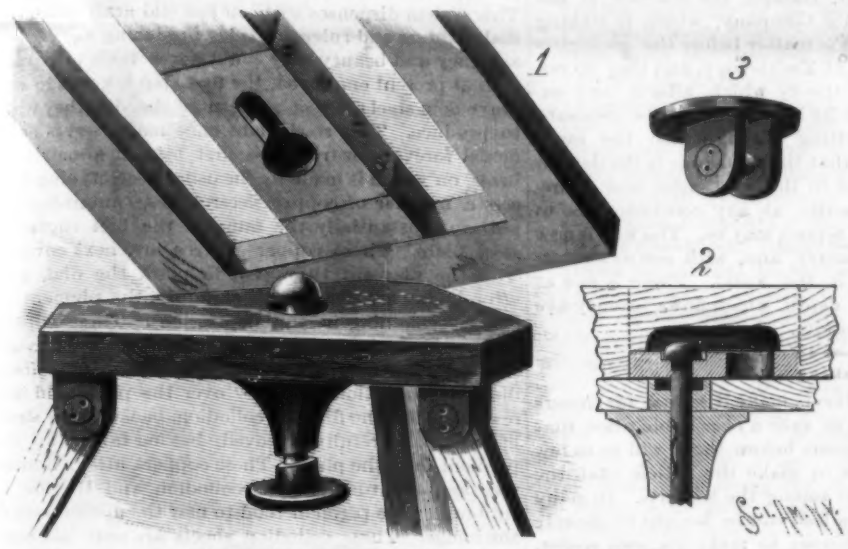
KEIL'S IMPROVED DOOR SECURER.

This invention has been patented by Mr. Henry F. Keil, of 162 East 58d Street, New York City.

IMPROVED CAMERA CLAMP AND TRIPOD HEAD.

The well known tripod screw for securing a camera firmly to the head of a tripod has many disadvantages, which have several times been pointed out. Yet it still continues to be one of the most indispensable articles a photographer has to use.

The object of the device shown in Figs. 1 and 2 of the engravings is to overcome the defects incident to the common screw clamp, by avoiding all separable parts and the wear of the screw thread, and at the same time to permit the camera to be easily and quickly secured to the tripod. A truncated cone shaped casting, having a projection provided with a socket or seat set flush with the top of the tripod head, is secured by screws to the under side of the head. The lower face of the casting is planed or filed off on a bevel. Passing through the hole drilled in its center is the fastening spindle, having a solid head turned on its upper end, and a thumb actuated disk, held rigidly by suitable screws, at its lower end. The upper face of the disk is beveled to correspond with the bevel on the casting above.



WARNER'S CAMERA CLAMP AND TRIPOD HEAD.

Located in a slot in the spindle is a very light steel spring (see Fig. 2), which, in pressing against the walls of the hole, holds the spindle by friction, in any position, as it is elevated or depressed, and at the same time allows the spindle to be freely rotated. When the spindle is not secured to the camera, its head is drawn down into the seat in the upper face of the casting, so that nothing will project above the surface of the tripod head.

A light metal plate, having its ends bent up around the sides of the central bar of the camera bed frame and secured thereto by screws, as shown in Fig. 1, has a key hole slot in which the head of the spindle of the clamp fits. The wood of the camera bed is dug out back of this slot, forming a recess, as shown in Fig. 2. It will be noticed this method of fastening the plate to the camera bed frame secures unusual strength, since the pull on the screws is at right angles to their length. To prevent any possible slipping of the camera after it is secured, a slight depression is provided in the inner surface of the plate at the end opposite the entrance slot, clearly seen in Figs. 1 and 2.

To clamp the camera on the tripod head, it is only necessary to rotate the spindle by the thumb disk until the two beveled faces are parallel with each other, then to push the spindle upward until the faces meet, which leaves the spindle head projecting above the tripod head. When the camera is then set upon the tripod, the head of the spindle enters the key hole slot, and by a slight movement lengthwise the head is brought directly over the seat of the slot. By slightly rotating the spindle by the fingers with the thumb disk, the beveled faces act upon each other like a cam, and at once draw down the spindle head into the seat of the key hole slot, firmly clamping the camera bed to the tripod head. A reverse movement allows the spindle to be pushed up so that the camera may be quickly removed.

It will be observed that the clamp is very simple, effective, and strong, is in fact more durable than a screw, not liable to get out of order, and with it a camera can be very quickly adjusted to a tripod.

The inventor prefers the triangular form of a tripod head, as shown in Fig. 1, and has the tripod legs rigidly secured thereto to avoid the wear and racking motion incident to detachable legs, which frequently occurs when photographing in a brisk wind. The fastening for the leg of the tripod is shown in Fig. 3, and consists of a round plate, provided with two projecting ears having a pin riveted between them, which passes through a hole in the extremity of the tripod leg. The plate is secured to the underside of the tripod head by screws. This construction makes a very rigid and steady bearing for the tripod head and camera. Both may be carried about on the shoulder without in any way straining the clamp.

Different sized cameras may be used on the one tripod head. The improved clamp may be fitted to any tripod head or camera. The inventor, Mr. M. P. Warner, Holyoke, Mass., or the manufacturers, The Scovill Manufacturing Co., 423 Broome Street, New York, are prepared to furnish clamps and fit them to tripods. Further information may be had by addressing either party.

THE NEW MILITARY MULTICYCLE.

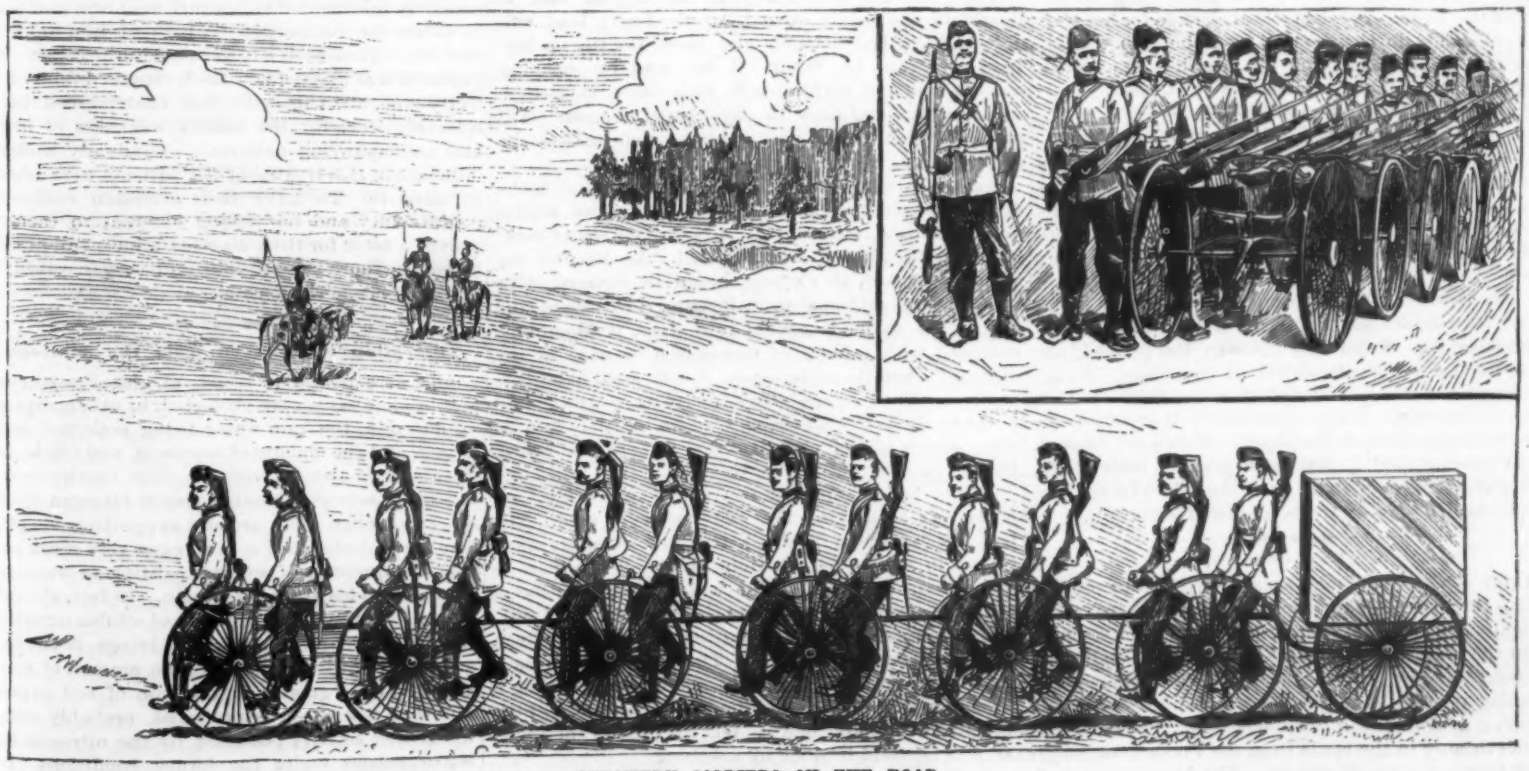
This machine, manned by ten men, which may recently have been seen traversing numerous London thoroughfares, is Messrs. Singer & Co.'s latest adaptation of their "Victoria" or "Four-in-Hand" quadricycle, and is intended for the rapid transport of infantry from one point to another. When fully manned, it carries twelve men, who can take with them, if necessary, a light baggage cart or ammunition wagon. By thus mounting the riders in single file, instead of two or four abreast, the machine is both rendered more manageable and it also presents less surface to a strong head wind. The speed got out of this machine is surprising. Ten miles an hour is a low average rate, and sixteen have been easily accomplished. It is less affected than any other velocipede by rough roads, and passes easily over a newly metaled track. All the tires are wired on the Otto principle, so that they cannot be greatly damaged by cuts from sharp stones. The whole control and steering of the machine is in the hands of one man, who found no difficulty in managing it even in the most crowded streets. It turned easily in less space than a hansom would have needed, and threaded its way among numberless vehicles without mishap. The crew in charge of this multicycle are all trained volunteers, who will be able to execute intelligently any military evolutions which may be demanded of them. The machine is now being severely tested at Aldershot by authority of the War Office.—*The Graphic.*

AP ROBERTS' NOVEL TRUNK.

A NOVEL TRUNK.

The trunk herewith illustrated is the invention of Mr. G. I. Ap Roberts, of River Falls, Wis. It is constructed at one end with an inclined bottom on which are secured one, two, or more bearings, each carrying a wheel, as shown in the sectional view, Fig. 2. The wheels do not touch the ground when the trunk stands on its bottom. The end opposite the inclined bottom is provided with handles. When it is desirable to move the trunk, the handles are grasped, and that end lifted until the trunk rests upon the wheels, when it can be rolled in any desired direction. It is apparent that this invention is also applicable to sample cases, tool chests, etc.

IT has been demonstrated that platinum wire may be drawn so fine as to be invisible to the naked eye, although its presence upon a perfectly white card can be detected by the touch, and can be seen by the aid of a small magnifying glass when the card is held in such a position that the wire casts a shadow.



INFANTRY SOLDIERS ON THE ROAD.

THE NEW MILITARY MULTICYCLE NOW BEING TESTED AT ALDERSHOT.

SEARCH LIGHT ON THE U. S. CRUISER ATLANTA.

The recently completed U. S. cruiser Atlanta is provided with two search lights of great power, one being located just back of the 8 in. long range breech loading rifle on the forward deck, while the other is immediately back of the stern chase 8 in. rifle. These lights are exquisite specimens of mechanism, and, although at first glance they seem to be extremely complicated, there is in reality no part not necessary in order to produce their quick, accurate, and easy universal adjustment.

The tube or cylinder containing the light proper has a length about equal to its diameter, and is mounted upon trunnions placed in bearings in a yoke swiveled upon a post or standard secured to the deck. The tube has a free movement on its trunnions to provide for vertical adjustment, and also moves freely on the pedestal for horizontal adjustment. These movements are accomplished by hand, the operator grasping the tube and manipulating it as may be necessary; but when a fine adjustment is required, the tube is clamped in the bearings and to the standard, when the movement is then controlled by a worm and gear.

Within the tube, the front of which is furnished with a glass door, and in the sides of which are sliding doors, through which the interior can be reached, is an arc light, the carbons of which are three-quarters of an inch in diameter. The arc is located in the focus of a parabolic reflector covering the rear end of the tube, the direct rays being prevented from leaving the tube by a shield held in front of the arc. The carbons are carried by a frame having a movement parallel with the axis of the cylinder, so that the arc can be maintained in the focus. Each carbon is provided with an independent adjusting apparatus, by means of which its point can be moved to either side, forward or back, and up or down. Through the center of the reflector is an opening, covered by a red glass, through which the arc can be inspected, and at the center of the right hand side of the tube is a prism. The light can be cut off by a shield, which can be swung down between the arc and reflector. A switch controlling the current of electricity is placed on the pedestal.

These devices for altering the position of the points of the carbons by hand are, of course, independent of the usual mechanism governing the carbons and regulating the arc. They are intended to provide means for shifting and regulating the arc in its relation to the focus.

In the top and bottom of the tube are openings, so covered as to prevent the light from passing out, which serve to ventilate the interior, the heat of the light being sufficient to create an upward draught.

The beam of light issuing from the lantern diverges slightly, and is sharp and well defined. When required, a lens can be fitted over the plane glass cover so as to produce a pencil of light having parallel rays.

It is evident that, from the elevated position of these two lights, their location on the ship, the extraordinary power of the light they throw, and the ease with which they can be handled, the surface of the water immediately around the vessel and at a long distance off can be brilliantly illuminated. The rapidity with which the beam can be swept around and adjusted to short and long distances will serve to give warning of the approach of any floating craft, and any object once sighted can, by means of the delicate adjusting contrivances, be easily and surely kept in the path of the beam. Provision is also made for keeping the light steady during the rolling of the ship.

For particulars concerning the search lights we are indebted to the courtesy of Lieut. W. P. Clason.

Early Use of Mahogany.

It is said mahogany was first known to Europeans through the fact that Sir Walter Raleigh, when at Trinidad in 1595, used planks of it to repair one of his vessels. The samples thus carried to England were much admired, but for over 100 years it was put to no practical use. In 1720, however, a Dr. Gibbons, of London, received a few mahogany planks from a friend in the West Indies, and employed a cabinet maker to work them up. From that time to the present, the wood has been a staple article of commerce. So far the supplies have practically all come from Spanish America, but there is some possibility that other sections may contribute to the supply. Mahogany, though of an inferior quality, has been shipped from Africa, and certain parts of India have proved to be adapted to its growth. Mahogany is of slow growth.

Steel Oars.

Yates & Co., Birmingham, are making an oar in which the blade is made from the best sheet steel, highly tempered. It is put forward as being much stronger than the ordinary wooden one, and cannot be broken without undue violence. The handle fits into a socket running nearly the whole length of the blade, and forming a backbone of great strength. The oar being much thinner in the blade than the wooden one, enters and leaves the water cleaner. The handles are made separately, of the ordinary spruce or ash, and if broken can be readily replaced.

Two Very Deep Wells.

The Northampton *Herald*, referring to a well boring for Belding Brothers, silk manufacturers, Rockville, Conn., says of the work: When the sandstone was reached, it was thought that at a depth of 750 feet that would be the last of it; but when this depth had been attained, and the sandstone still continued, it was then predicted that by the time the drill had gone down 1,250 feet, it would be through the stratum, but not so; and again another prediction was in order, and 1,500 was the depth named. But the well has been bored some 3,440 feet, all but 200 feet being through sandstone, and now the best geologists are at loss what to say, for the question how far the sandstone does extend is a conundrum which they "give up."

Prof. Emerson, of Amherst College, and other eminent geologists declare that it is impossible to tell anything about it. Mr. Haskell, the solicitor of the North American Mining Company, which is sinking the well, has brought the matter before the geologists of the Boston School of Technology, and they do not attempt to give any theory which affords any encouragement as to how far it will probably be necessary to go down before getting through with the sandstone. The theory is that the sandstone is the deposit of a vast river current in the past ages, and therefore it is difficult to arrive at any conclusion as to what the depth of this deposit may be. The well is now the deepest in the country, and, with one or two exceptions, the deepest in the world. There is one at St. Louis 3,180 feet in depth, which flows seventy-five gallons of water per minute.

Making Solder.

The solder manufacturers make it so easy for tinners to procure solder, and at such a reasonable price, that it may be only a few years before there will be so few tinners who know how to make the article that the process may be counted among the lost arts. In many country towns, old tea lead can be bought so cheaply that it may pay the tinner to make his own solder. To make good solder, care must be taken that the metals are not heated too much, or they become hard, or lose their life. The usual way of making solder is to put a kettle on the forge and melt the pig tin, then the lead is added. If this operation is left to incompetent persons, there is danger that the material may be heated too hot. This should never occur.

The tea lead can be melted quickly by bending a piece of heavy iron in the form of a trough, which can be placed on the forge in an inclined position. By having a proper amount of fire under the iron, and burning resin with the lead, the paper can be burnt off very rapidly. A pot can be placed under the trough to catch the melted lead. As soon as enough lead has been melted, the pot of lead can be weighed, and the proper amount of tin added to make the desired quality of solder. For general use, most tinners prefer half and half; while for rough work, whatever that may be, a solder composed of fourteen parts of tin to twenty-two of lead may do.

The greatest care should be taken that there is no zinc in the solder; if there is a suspicion of any, it can be removed by burning sulphur on the surface of the melted solder. This operation should not be continued too long, as sulphur will eat tin as well as zinc.

When the metal is ready to be dipped out, it should be constantly stirred, so the heavy lead will not settle to the bottom, and leave the tin on top. Its paper can be taken off tea lead by opening out the lead and sprinkling it with water, then folding up again, and allow to stand until the paper will peel off. This saves one heating, and makes the solder richer.

There are two kinds of tea lead. One kind looks more like solder, it is so light colored. This kind is said to contain bismuth. It is better for solder making than the darker colored kind. As long as the solder is melted, its surface should be covered with resin, to prevent the air from forming the oxide of tin; and if the solder is poured into pans, it should be skimmed with a piece of Russia iron as wide as the dish, so, when the solder cools, it will look like cakes of silver. The "scraps" from the solder boards should never be melted with the new solder, as there may be some pieces of zinc or galvanized iron in the collection.

As hot metals are not convenient to weigh, another way of making the solder may be used. The lead can be melted in the kettle, and about as much tin put in as may be thought right. When there is more than half lead, a star will form on a button of the solder as it cools; as more tin is put in, this "star" will disappear, until the button shines like silver. Then the solder is all right. These buttons are made by taking out a little solder in a ladle, and pouring it on a heavy stake, so it will cool at once. A little practice will enable one to tell the quality of solder as well as could be done by weighing.

A little bismuth added to solder makes it melt easier, and teaspoons can be made that will melt on being put into hot tea. This makes a nice joke to play on people, for it is enough to surprise any one to have tea to drink so hot as to melt the teaspoon.

It is by putting bismuth into solder, so it will melt easy, that our brother tinners in China manage to solder the lead lining of tea chests so nicely and cause the "Melican" tinner to wonder how it is done.—*American Artisan.*

How Watch Dials are Printed at Elgin.

The progress of art is nowhere more apparent than in the to-day method of dial making, contrasted with the old system of hand painting and ruling.

We have just examined the present system of printing dials employed at Elgin, a system first invented by Henry Abbott, of New York, and supplemented by the experiments and exertions of Mr. Eggler, the present superintendent of the dial department at Elgin. This system dispenses with all the old army of skilled dial painters and rulers, besides producing work of an accuracy and beauty they could never hope to equal.

As at present employed, the first step taken is to engrave on a steel plate a pattern of the dial they wish to produce. This steel plate once made serves as a model forever, for from it is first formed a matrix of brass, on which is made by the usual electrotyping process a number of copper electrotypes, containing the pattern substantially the same as the first engraved steel plate. These copper electros are next covered with the pigment they wish to mark the dial, and after drying are cleaned off carefully, the pigment of course remaining in the depressions. These copper plates are next placed upon a flat, revolving table, and collodion poured upon them. Centrifugal force disperses the collodion evenly over the plate, and in a few moments the film of collodion, backed by a sheet of paper, is carefully removed, having taken up the pigment from the plate. These coppers, after a limited use, are discarded, as the collodion and friction of rubbing in the pigment tend to mar the distinctness of the image. These collodion sheets are next laid carefully on a dial which has been already baked and polished, and after removing the paper backing, used to facilitate handling, the dial is gently fired to evaporate the collodion and fix the pigment firmly on the enamel. Dials are thus produced of a beauty and accuracy all depending upon the execution of the original model; and as such a model, laid out mathematically and finely engraved, serves to always produce its counterpart, dials are made with an accuracy and cheapness not to be attained by the old process of individual treatment. Various colors may be printed, only requiring care in the first laying on of the pigment.—*C. B. Garrett, Jewelers' Journal.*

Interesting Cure of Insanity.

An interesting instance of fighting insanity by insanity has recently been noticed among the Blackwell's Island patients. Two lunatics had been received who were disposed to commit suicide. In addition each possessed a special delusion, one to the effect that he was a cow, the other that his head was an iron ball, and was to be rolled along the floor. They carried these beliefs into action, one striking his head against the padded walls of his cell, the other rolling his head, and of course his body with it, along the floor. The two patients were placed together, and each was privately informed of the other's weakness and warned to watch his companion to prevent him taking his own life. Thus each had a charge in the other. Their vigilance was unceasing. Each supposed himself perfectly sane, and this belief was accompanied by considerable scorn for the other's weakness of intellect and accompanying delusions. Gradually under the influence of this treatment the patients were observed to improve. To have their attention centered on definite duty and on objects external to themselves proved a tonic for their diseased minds, and gradually a complete cure was effected, and they received their discharges from the asylum.

Absorption of Nitrogen from the Atmosphere.

Soils were placed in vessels of glazed earthenware, and in some cases were protected, in others exposed to air and rain, the rain water being collected and analyzed, and the amount of ammonia and nitric acid in the air being also determined. The results show that vegetable soils continually absorb nitrogen from the air, even when they are not supporting vegetation. The amount absorbed is in all cases very much greater than the quantity of nitrogen existing as ammonia or nitrogen oxides in the air or rain. In fact, the rain removes from the soil in the form of soluble nitrates considerably more nitrogen than it brings in the form of ammonia. At the same time, the amount of nitrogen absorbed is far greater in the case of soil exposed to rain than where soil is protected, probably owing to the greater activity possessed by the nitrogen-absorbing organisms under the former conditions. In the majority of cases, a notable proportion of the absorbed nitrogen is converted into nitrates.—*Berthelot, Compt. Rend.*

Correspondence.

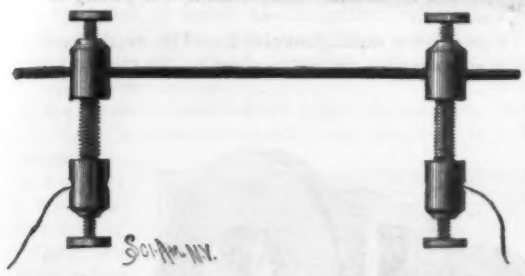
AN IMPROVED RHEOSTAT FOR INDUCED CURRENTS.

To the Editor of the Scientific American:

While residing on Staten Island, N. Y., I invented a simple rheostat for the Faradic current, the construction of which was published in the SCIENTIFIC AMERICAN on November 9, 1878.

When applying the Faradic current through this rheostat for therapeutical purposes, the seance has to be interrupted whenever a change in the strength of the current is required. My present rheostat obviates this, besides being still simpler than the other.

Directions for Making.—File the screws of four binding screws *lengthwise*, half way; put the filed, flat sides of two binding screws against each other, and tie or solder them together, thus obtaining two double binding screws, joined end to end.



The black line indicates the joining. Roll tightly a thick knitting needle three or four times around in thin writing paper, and glue or gum the paper while rolling. When dry, cover the paper with plumbago by using either stove blacking or a soft pencil. Slip the binding screws on the blackened needle, and the rheostat is ready. F. G. OEHME, M.D.

Roseburg, Oregon.

Artificial Rubies.

Many visitors to the Paris exhibition of 1878 will remember an interesting collection of artificial rubies exhibited by M. Fremy. These had been obtained either by heating together at a high temperature a mixture of alumina and minium or a mixture of equal weights of alumina and barium fluoride, with a trace of potassium bichromate in each case to impart the rose color. As earthen crucibles had been used in the operation, it was then supposed that silica derived from them might have determined the crystallization of the alumina. This, however, has since been disproved in respect to the latter mixture, and numerous experiments made by M. Fremy in conjunction with M. Verneuil have demonstrated that nearly all the fluorides possess, to a remarkable degree, the property of determining at a red heat the crystallization of alumina (*Comptes Rend.*, civ., 738). Calcium fluoride, especially, appears to exercise over alumina an enormous power of mineralization; for when pure native calcium fluoride and pure alumina were calcined for some hours at a white heat in the same crucible, but separated by a platinum plate pierced with holes, the emanations from the fluorspar proved sufficient to cause the alumina to change its amorphous state and form a crystalline mass. In order, however, to prevent any "perturbation in the commerce of precious stones" being caused by this announcement, M. Fremy adds, in a foot note, that although the rubies obtained by this method are of fine color, good shape, very distinct in crystallization, and in every respect more beautiful than previous products, they are still small, and therefore without commercial importance.—*Pharm. Journal.*

The Origin of a Small Race of Turkeys.

In 1877 the author sent a number of wild turkeys to Santa Cruz Island, situated in the Pacific Ocean, about 20 miles off shore. The island is about 30 miles long, and five to ten wide, and contains no animals injurious to fowls excepting a small gray fox. The first season four hens raised 61 birds to maturity, which attained the size of the parents. The next year the produce was 120, of about the same size. These birds multiplied and lived perfectly wild in the forest, and in a few years it was observed that they had diminished very much in size, so that now it would be impossible to find a cock which would weigh over six pounds, which is less than one-third the size of their original ancestors, or the first and second island generations.

The author thinks this is undoubtedly a case of pretty close inbreeding, although he does not think the fact is conclusively established. These birds had an abundance of feed on the island, consisting of acorns, berries, insects, and grass, and have always been healthy and vigorous, with habit of flight about the same as that of the Eastern wild birds in their native haunts. The writer has introduced wild turkeys in various places on the Pacific slope north of San Francisco, which have been prolific and healthy, and attained the normal size.—*J. D. Caton, American Naturalist.*

The Vienna Papyri.

A recent number of the Vienna *Mittheilungen*, which communicates periodically the results of the examination of the papyri of the Archduke Rainer, contains a notice by Professor Bickell of a fragment of an ancient recension of a gospel. Professor Bickell regards it as a Greek translation from the Aramaic. A photographic facsimile of it is given, which is about 12 centimeters square and does not contain more than 100 Greek MS. symbols. It gives the words addressed by Christ to the Apostles after the last supper, as they are recorded in St. Matthew xxvi., 30 to 34, and St. Mark xiv., 26 to 30, but with notable variations. For instance, the words, "After I am risen, I will go before you into Galilee," do not appear in this fragment. The noted palæographist Wessely believes the fragment dates from the beginning of the third century. Professor Bickell recalls that Papias mentions, according to the testimony of St. John the Disciple, that St. Matthew wrote down in Aramaic a collection of Christ's discourses, and that this collection formed the groundwork of St. Mark's gospel. Hence he suggests that this fragment may really be a portion of a pre-canonical gospel. Professor J. Krall has discovered from five fragments of a papyrus on "Æsthetics" that the lost play entitled Scylla, hitherto attributed to Euripides, was in truth a dithyrambic poem by Timotheus, who flourished a century later. The editor himself, Professor Karabacek, states on the authority of one of these papyri that the earliest mention of the Turks by name must now be pushed back to 808 A.C. Hitherto the earliest date, as found in a MS. in the British Museum, at which the Turks appear in history was set down at 873 A.C.

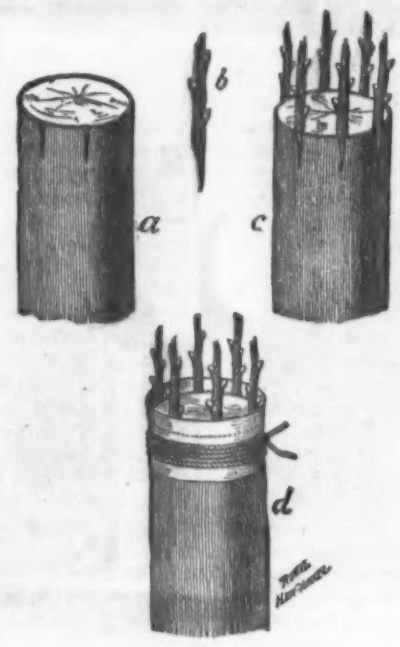
The Influence of Tea, Coffee, and Cocoa on Digestion.

Dr. James W. Fraser, in a recent number of the *Journal of Anatomy and Physiology*, has recorded the results of an interesting series of experiments on the action of our common beverages on stomachic and intestinal digestion. The experiments have been most carefully arranged from a physical standpoint, and give us some valuable hints on the digestion of the chief alimentary principles, but they have no bearing, it should be mentioned, on individual variations of human digestion, or on the influence of the various glands in preparing the gastric or intestinal juices. They are, however, of much value in showing how standard preparations of the peptic and pancreatic ferments are modified in action when our ordinary daily beverages are allowed their free action on the digestion of various articles of food. The digestive processes were carefully investigated, and absorption was imitated by a proper dialyzing arrangement. An artificial peptic juice, and afterward an artificial pancreatic juice, were employed, and the amount of nitrogenous matter dialyzed was most carefully estimated. The food stuffs experimented on were raw and cooked serum and egg albumens, raw and cooked myosin, syntonin, alkali albumen, casein, gluten, starch, and oleine. The results obtained from an exhaustive series of experiments and analyses show that all the three typical infused beverages—tea, coffee, and cocoa—retard the digestion and absorption of all the nitrogenized proximate principles of dietetic substances when peptic and pancreatic digestion are taken together, and that they uniformly retard peptic digestion, although tea may assist the diffusion of peptones from the stomach. Pancreatic digestion is also uniformly retarded, and diffusion thereafter is but rarely assisted, so that neither of them compares advantageously with water as a standard beverage for experimental investigations. A summary of dietetic advice is added to Dr. Fraser's observations, which will, in the main, agree with that which is now given by our best authorities in cases of dyspepsia; and we are glad that experimental inquiries afford so strong a basis of support to empirical clinical observations:

"1. That it is better not to eat most albuminoid food stuffs at the same time as infused beverages are taken, for it has been shown that their digestion will in most cases be retarded, though there are possibly exceptions. Absorption may be rendered more rapid, but there is a loss of nutritive substance. On the other hand, the digestion of starchy food appears to be assisted by tea and coffee; and gluten, the albuminoid of flour, has been seen to be the principle least retarded in digestion by tea, and it only comes third with cocoa, while coffee has apparently a much greater retarding action on it. From this it appears that bread is the natural accompaniment of tea and cocoa when used as the beverages at a meal. Perhaps the action of coffee is the reason why, in this country, it is usually drunk alone or at breakfast, a meal which consists much of meat, and of meats (eggs and salt meats) which are not much retarded in digestion by coffee. 2. That eggs are the best form of animal food to be taken along with infused beverages, and that apparently they are best lightly boiled if tea, hard boiled if coffee or cocoa, is the beverage. 3. That the casein of the milk and cream taken with the beverages is probably absorbed in a large degree from the stomach. 4. That the butter used with bread undergoes digestion more slowly in presence of tea, but more quickly in presence of coffee or cocoa; that is, if the fats of butter are influenced in a similar way to oleine. 5. That the use of coffee or cocoa as excipients for cod-liver oil, etc., appears not only to depend on their pronounced tastes, but also on their action in assisting the digestion of fats."—*Lancet.*

HOW TO GRAFT OLD TREES.

The *Rural New-Yorker* says that the following is an easy and effective method of grafting old trees. By it the percentage of failure is reduced to a minimum, and branches at least six inches in diameter, and, in the case of pear trees, 75 years old, may be worked with assured success. Last year we mentioned the case of such a pear having been grafted two years before with the Kieffer, that gave a full crop last year fall. Saw off the branch at right angles to the stem to be grafted,



CROWN GRAFTING.

as shown by *a*. Then cut a clean slit in the bark through the wood, as shown—a slit the same as in budding. Separate the bark from the wood and insert the cion, *b*, one for each slit. The number of slits for each stock will be determined by its size. We will suppose the stock illustrated to be six inches in diameter, and that six cions are to be inserted. The stock after receiving the six cions is shown at *c*. Grafting wax is not needed. A thick paper may be wound about the top of the stock, extending about one inch *above* it and securely tied with strong twine, as shown at *d*. The space above the stock encircled by the inch of paper may then be filled to the top of the paper with a puddle of soil and water, made so thin that it can be readily poured from any suitable vessel. This mud protects the surface of the wood of the stock, and excludes the air from the insertions. It gives every advantage of wax without its objections. Of course, stocks of any size may be worked in this way. One, two, or any number of cions may be inserted, according to the size of the stock.

Geometrical Proportion.

Various problems have been based on the rapid increase of the last number in a series of geometrical proportion. A man offers to sell a horse for what a farthing will increase to if multiplied by two, and the product doubled successively for every nail, twenty-four in all, in the horse's shoes. The twenty-fourth term of a geometrical proportion with a ratio of 2, and whose first term is unity, is 8,388,608. A pound sterling contains 960 farthings, so that the horse would cost over 873 pounds, or over $4,000. A cent treated as the basis for a similar calculation gives at the end of thirty days over five millions of dollars. We give below the series, numbering also each term. It will be noticed that the increase at first is slow. Thus eight days are needed before the amount increases so as to exceed a dollar. To find the sum of any number of terms, the last one must be multiplied by two and one must be subtracted from the product.

1	$0.01	16	$327.68
2	.02	17	655.36
3	.04	18	1,310.72
4	.08	19	2,621.44
5	.16	20	5,242.88
6	.32	21	10,485.76
7	.64	22	20,971.52
8	1.28	23	41,943.04
9	2.56	24	83,886.08
10	5.12	25	167,772.16
11	10.24	26	335,544.32
12	20.48	27	671,088.64
13	40.96	28	1,342,177.28
14	81.92	29	2,684,354.56
15	163.84	30	5,368,709.12

INEXPENSIVE ARC LAMP.

BY GEO. M. HOPKINS.

For most experimental uses, and for practical use in connection with the projecting lantern, the simple and inexpensive arc lamp shown in the annexed engraving serves a very good purpose. It requires an occasional adjustment of the carbons to maintain the arc; but this is a matter of little consequence if the lamp is used for a purpose requiring the constant presence of the operator in its vicinity. Should the arc be broken, it may be re-established instantly without careful adjustment of the carbon rods. As will be seen by reference to the engravings, the lamp requires little skill or time for its construction, and the materials of which it is made cost practically nothing.

The experimental lamp shown in Fig. 1 consists of two stout copper wires, say No. 12, each bent to form a

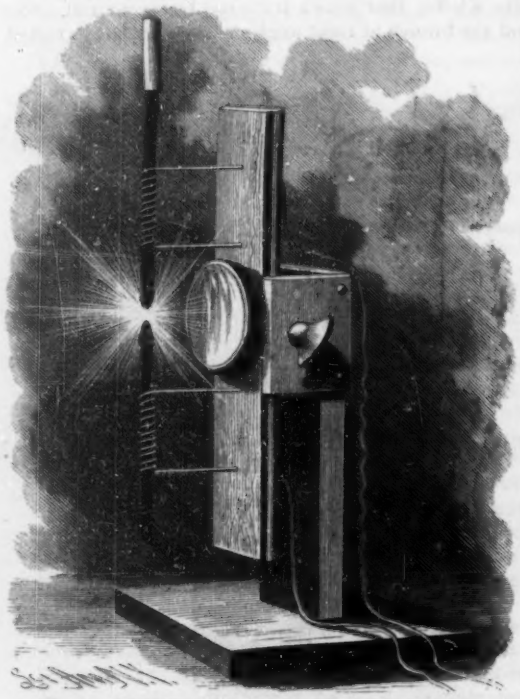


Fig. 2.—SIMPLE ARC LAMP FOR PROJECTION.

helix of sufficient size to readily receive the carbon rod and permit of turning the rod for the purpose of feeding it forward to maintain the arc as its point is consumed. The straight ends of the wire extend in the same direction at right angles to the helix, and are offset and inserted in a board and bent down upon the under side of the board, as indicated by the dotted lines in Fig. 1. The two helices are arranged axially in line, so that the points of the carbon rods will center accurately, and each helix is bowed at its center to secure a spring contact with the sides of the rod.

The electrical connections are made by clamping a copper burr down upon one foot of each helix, and upon the end of one of the conductors.

The outer ends of the rods are inclosed in short pieces of rubber tube, to prevent an electrical contact of the fingers with the rods. This simple lamp has been found very useful in experiments in connection with the eight light dynamo, recently described in these columns. When this lamp is used in connection with a small dynamo like the one referred to, or with a battery, no particular care is necessary in handling it, but it should be used with caution in a circuit conveying a very heavy current. When used in connection with the eight light dynamo, the carbon rods should be five-sixteenths inch in diameter. By turning one or the other of the rods in the helix, it is moved forward or backward, according to the direction in which it is turned; the friction of the carbon in the helix giving the carbon the motion of a screw in a nut. When the arc is broken, it is unnecessary to screw the rod forward and then retract it, to re-establish the arc, as the wire will spring sufficiently to permit of pushing the rod forward to bring the points in contact, and the resilience of the wire will return the carbon to its normal position, thus establishing the arc.

The lamp is adapted to lantern use by grooving the edges of the board and mounting the board between clamping pieces attached to a standard and provided with tongues fitted to the grooves of the board, a screw being inserted in the clamping pieces for drawing them into contact with the edges of the board, as shown in Fig. 2. A small concave reflector is attached to the center of the board, to reflect the light which would otherwise be lost.

The clamping device permits of centering the reflector, and the arc is retained opposite the center of the reflector by the occasional adjustment of the carbons.

AMATEUR MECHANICS.

SIMPLE BACK GEAR FOR FOOT LATHES.

It often happens that the owner of an ordinary foot lathe desires to accomplish work beyond the capacity of his lathe. For example, he may desire to bore an engine cylinder or turn an iron wheel, or turn or bore a large piece of wrought iron or steel. Any of these operations requires slow speed and strong driving, both of which are impossible without back gear or its equivalent; but back gear is expensive, and most foot lathes would not warrant its application.

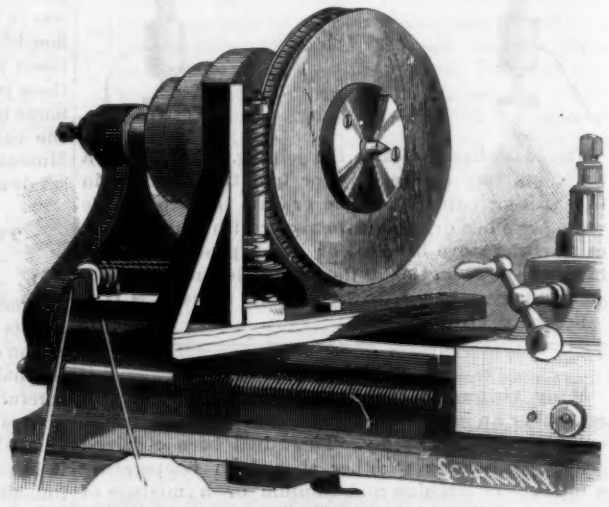
The engraving shows a simple and inexpensive device for securing a slow, strong motion, which is adapted to much heavier work than that commonly done on small lathes. Of course, there is a limit to the size of work possible with a light lathe, even though provided with back gear, the limit being determined by the strength and rigidity of the bed and other parts; but almost any lathe worth possessing should be sufficiently rigid to permit of boring the cylinder of a one horse power engine and doing all of the other work on such an engine, with the exception, perhaps, of boring and turning the flywheel.

The attachment is so simple that little more than a glance at the engraving is required to convey the full idea of its construction and application. To the back of the face plate is secured a disk of hard wood, such as maple, cherry, or mahogany, as large in diameter as can be swung in the lathe. The wood may be fastened to the face plate by means of ordinary wood screws passing through the plate into the wood, or by bolts. Two small straight lag screws, or coach screws, or large wood screws, are selected, one of them to be used as a tangent screw for driving the wooden disk, the other to be fluted like a tap and used for cutting the edge of the wooden disk, so as to convert it into a worm wheel adapted to the tangent screw.

In the edge of the wooden disk is turned a groove, formed on a circular curve of a little greater radius than that of the screw.

The screws are centered in the lathe and trued, and a journal is formed near each end of each screw. A small grooved pulley is fitted to the shank of one of the screws, and the screw is journaled in wooden or metallic boxes, secured by small clips to an upright supported by a cross bar extending across the lathe bed and held in position by a bolt. The screw is now fluted either in the lathe or by means of a file, the flutes being preferably formed on a spiral. The screw is then heated red hot, plunged into powdered prussiate of potash, again heated to a red heat, and finally plunged into cold water. This operation casehardens the iron, so that it will cut the wood without being easily dulled. The fluted screw is now placed in its journal boxes, and a round belt is passed from the drive wheel of the lathe over two small guide pulleys, supported as shown, and around the pulley on the screw.

The screw is rapidly revolved, and the frame by which it is supported is driven forward by the taps of a hammer until the threads engage the periphery of the wooden disk. When the disk has made one revolution, the marks of the screw are examined, and if they coincide where they overlap, the operation is continued by gradually tapping the frame forward until the screw has cut as deeply as possible into the wood, when the fluted screw is replaced by the entire one, and the attachment is complete.



SIMPLE BACK GEAR FOR FOOT LATHES.

Should the threads lack much of coming together after the disk has made one revolution, the disk must be turned down a very little.

The wooden worm wheel should be saturated around its periphery with a heavy oil, or what is better is to rub on tallow and melt it by means of a gas flame or lamp, so that it will be absorbed by the wood.

IT has been computed that the death rate of the globe is 67 a minute, 97,790 a day, and 35,639,835 a year, and the birth rate 70 a minute, 100,800 a day, and 36,792,000 a year.

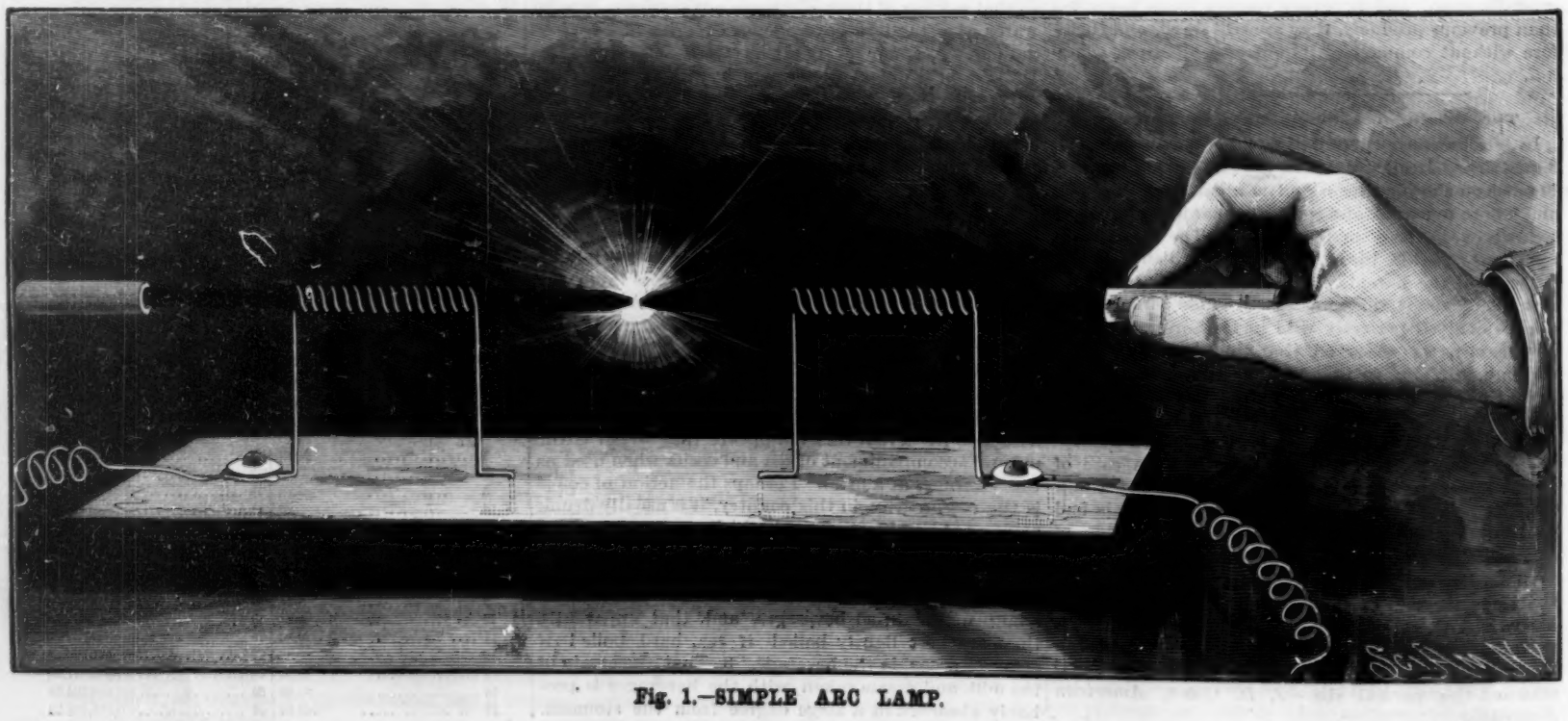


Fig. 1.—SIMPLE ARC LAMP.

A PAIR OF LIVE SALAMANDERS.

A large tub partly filled with water, and placed in the middle of a room on the second floor of Reiche & Bros.' animal house in Park Row, New York City, contains a pair of the world-famed salamanders, which ancient historians, and indeed some later naturalists, incline to place in the same category with the fabled sphinx, the dragon, and the basilisk. They are of the largest variety known (*Cryptobranchus maximus*), and said to have been found in the crater of an extinct volcano near Niphon, in Japan, lying torpid in an Avernus-like pool.

They belong to a second family of the order Batrachia, which also includes lizards and frogs, and can live out of as well as in the water. Having the legs of a saurian joined to the form of a fish, exuding an acrid humor through a skin covered throughout its whole extent with black warts and tubercles, the giant salamander seems the embodiment of all that is most repulsive among the reptilia. Goaded by the keeper with a sharp stick, it comes to the surface and spits and hisses, and its little eyes, sunk deep amid the cankerous growths of the head, burn like coals of fire. Then it looks a very demon.

One of the present specimens is 3 feet or thereabouts in length, and of a chocolate-brown color; the other is somewhat smaller and black. The mouth, when open, shows a double set of serrated teeth, with points like so many needles. The tongue is cream-pink, pointed, and has the quick, almost spasmodic movement of the snake's.

The second night after their arrival, both escaped from the tub of water and left upon the sanded floor of the room two trails of slime, indicating the several directions they had taken. The smaller was found only a few feet distant, behind a pile of boards. The trail of the larger one led out into the hall, down two flights of stairs, and into the cellar. Before it was found, a black bear, chained in the cellar, suddenly died, and the dealer in animals insists that it was killed by the intruding salamander.

He thinks that the reptile, while crawling along, was attacked by the bear, and, in self-defense, spat at him. The fluid which it ejects from its mouth is milky-white, acrid, and does not differ essentially from aconite or wolf's bane. It is not soluble in water, but dissolves readily in spirits of wine. In taste it resembles corrosive sublimate, and is very astringent.

The student of natural history will scarcely fail of regret that a careful autopsy was not made of the dead bear to discover whether or no there was any proof that it was killed by the salamander. It is interesting to note that, when the wandering salamander was at last found, the experienced naturalist-dealer, thrusting aside for the time the terrible warnings that have come down through the ages of the deadliness of the salamander, coolly threw a blanket over the reptile and lifted him into the waiting tub, thus evincing his confidence in the more recent investigations of contemporary naturalists.

The two salamanders swim lazily about their tank, the smaller of the two continually seeking to hide his head under the big one, and both keeping well down toward the bottom, as though their eyes were unused to so strong a light as that shining upon the surface. At stated times, both come to the surface for air, though careful observations show that they can remain below for at least half an hour without apparent discomfort. When out of the water, there is no glisten to the skin, as in other of the amphibia. The surface is dull, though constantly changing its complexion as the great warts which cover it close up or separate with the rhythmical movements of the limbs. A close examination shows the bodies of these creatures to be alive with the fœtid exudations from the pores; an exudation which, if active in the normal state, is strikingly increased if the animals be irritated, in proof of which the keeper, prodding the larger salamander with a pointed stick while crawling on the floor, the slimy track he left behind him visibly thickened.

With commendable alacrity and caution, the New York Board of Health sent a sanitary inspector to examine the conditions under which the reptiles were being cared for. Authorities say that everything the salamander touches is impregnated with poison. That distinguished naturalist, Pliny, says:

"Of all the venomous animals, it is the salamander that is by far the most dangerous, for while other reptiles attack individuals only, and never kill many persons at a time, the salamander is able to destroy whole nations, unless they take proper precautions against it. For if this reptile happens to crawl up a tree, it infects all the fruit with its poison, and kills those who eat thereof by the chilling properties of its venom. Nay, even more than this: if it only touches with its foot the wood upon which bread is baked, or if it happens to fall into a well, the same fatal effects will be sure to ensue. The saliva of this reptile, if it comes in contact with any part of the body, the sole of the foot even, causes the hair to fall off from the whole body."

Though this is a highly colored and evidently erroneous description of the properties of the salamander, there is no doubt that its saliva and secretions are poisonous, and one cannot help regretting that the Board of Health did not send an analytical chemist along with its inspector, so that we might know just how much truth there is in the water story; that is to say, just how far the poisonous influence of this reptile will extend in a running stream or in still water.

The result of the inspector's visit was an order from the Board of Health that the water from the great tub be carried away only in galvanized iron buckets, and that disinfectants be used freely in and about the premises as long as the salamanders are there. A very interesting experiment was made last week to test the power of the reptiles to destroy life. A rabbit was brought in and thrust against the large salamander, the same being placed upon the floor for the purpose. Bunny gave the same manifestations of fear as when pursued by his arch enemy, the ferret. He shook as with a palsy, his eyes filled with tears, and his powers so weakened that, at times, the limbs refused to bear the body upright, and he fell upon his side or head. The reptile, as though regarding the occasion as unworthy the exhibition of his much vaunted powers, simply thrust poor Bunny aside with a lazy movement of his ugly head, and all attempts to make him bite or spit failed signally.

Like his suppositious congener, the newt, the salamander's favorite food is said to be flies, bugs, frogs, and fish; and though he can bite, as is proved by the ease with which he masticates the meat on which he is now fed, and the fact that he has been known to eat his own species, nature has evidently supplied him with other means of attack and defense than the needle-like teeth that deck his jaws. The head is large and flat, having a single branchial orifice on each side, thus closely resembling a North American tailed batrachian reptile called the menopoma, and which is said to connect the perrenibranchiate amphibians with the salamanders. Indeed, no less an authority than Van der Hoeven classes the menopoma with the reptile under discussion, which he calls *Cryptobranchus japonicus*. The tail is about one-third the entire length, and there is a loose fold of skin extending from the head all the way to the tail, which seems to have an active part in the locomotion.

A wonderful property of the salamander is its power of enduring extreme heat or cold, which led to its being called "Daughter of fire with body of ice." Perhaps it was because of his ability to withstand very high temperatures that induced the belief among the ancient Greeks, who seem to have originated the fabulous stories concerning the salamander, that he could survive the furnace. It is certain that he has been found frozen in blocks of ice and come to life again upon its melting.

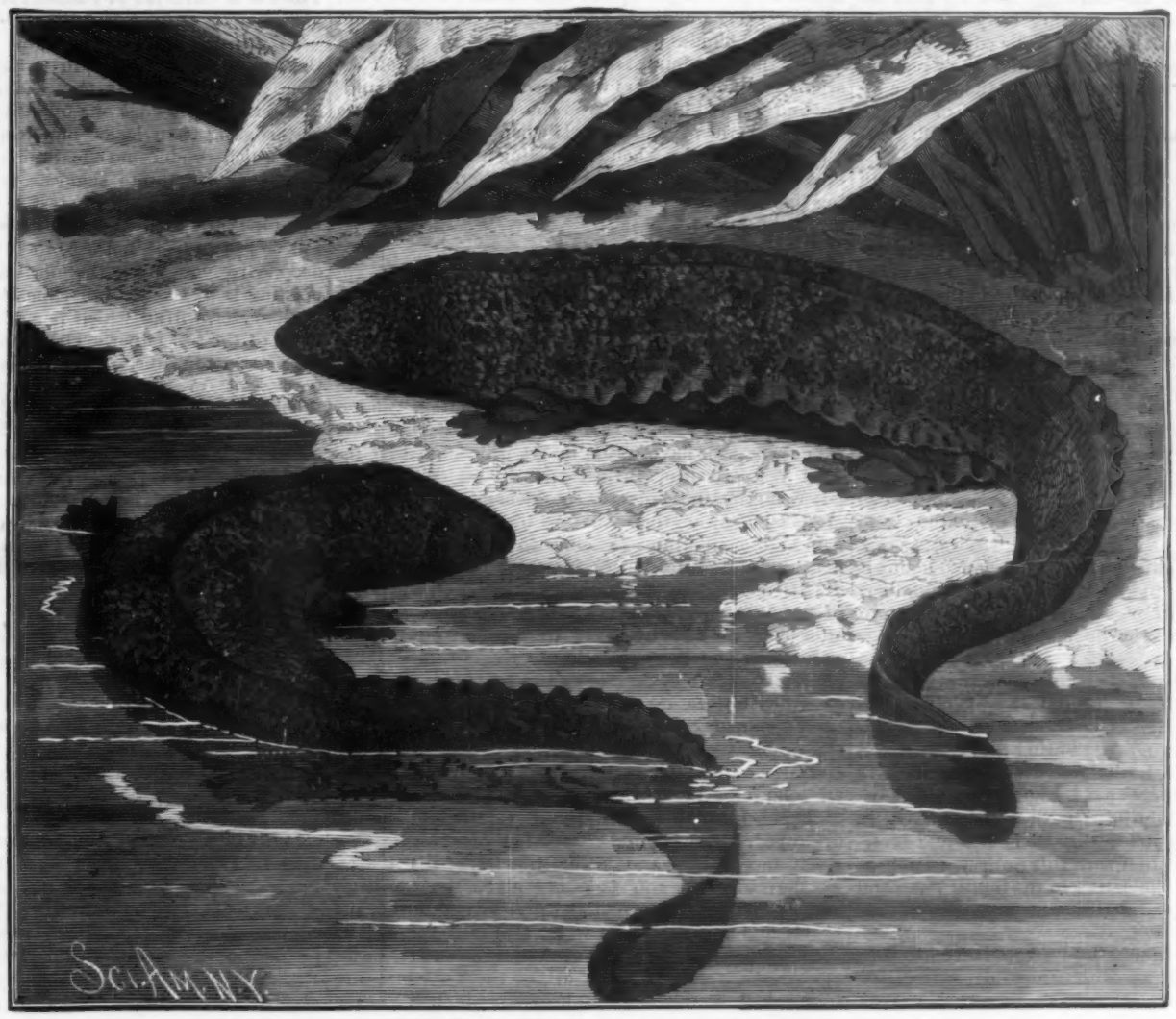
Another wonderful property is his power of renewing portions of his body when once removed, a case being on record where a lost eye was completely renewed in a year's time, and his extraordinary tenacity of life.

M. Dumeril mentions a case where three-fourths of the head of a salamander was cut off with a pair of shears. Put into a glass vessel and deprived of nostrils, eyes, ears, and without a tongue, he continued to live and to move around, even when cicatrization had so done its work that there was no normal connection with the lungs, and no passage for receiving food. Aristotle, Nicander, Dioscorides, and Pliny all agree that the salamander is proof against the fiercest flames. The latter authority even outstrips the others in declaring it has no sex. Linnæus places the salamander among the lizards, though he has a heart with two auricles.

As to the ability of the salamander to withstand fire, the only evidence recorded of later years was supplied to the naturalist Buffon by M. Ponthonier, a French consul at Rhodes. He declared that he saw a salamander—one of the smaller species—walking about among the live coals of his kitchen fire. He removed it while still alive; the balance of his household, insisting it was the devil, flying for their lives meantime. Buffon, removing it from the bottle in which it was sent him, discovered that a portion of the reptile was missing, and concludes therefrom that it would have been entirely burnt up had the Frenchman not rescued it in time.

Ancient authority says that the wonderful cloth sent by the Tartar king to the Roman pontiff, and containing the holy napkin, the *sudarium domani*, in which it is yet preserved, was made of the skin of the salamander. For centuries the heart of the salamander, worn in an amulet, was thought to be a prophylactic, and a certain cure for leprosy.

The giant salamander is said, on good authority, to be a specimen of the now extinct species, a portion of whose remains, found in 1725 incrusted in a large block



A PAIR OF LIVE SALAMANDERS.

of stone, and mistaken for those of a human being, gave rise to the belief that man witnessed the Deluge, and excited great interest among the palæontologists. We are told that "Scheuchzer, a Swiss naturalist of some celebrity, who added to his scientific pursuits the study of theology, being called upon to give his opinion as to the nature of this relic of ancient times, declared that he recognized in the skeleton the remains of a man. In 1726 he published a description of these fossil remains in the Philosophical Transactions of London, and in 1731 he made it the subject of a special dissertation entitled '*Homo diluvii testis*'"—man a witness of the Deluge.

Many Items of Interest.

Bradstreet's has compiled very exhaustive tables on the number of workmen at present engaged in the various industries of the country, the wages paid them, and other highly interesting data, and the general results shown are very satisfactory. It appears from them that at least 400,000 more workmen are engaged than at this time two years ago, and that the wages, which had sunk very low in the two years prior to 1885, are at present at about the same figures they were during the bright business year of 1881–82.

A correspondent of the *Carriage Monthly* asks the editor for a good receipt for mixing body rough-stuff out of Reno's umber and orange. The editor applied to Reno Bros. for the information, and their reponse contained the following receipts, with the further remark that many painters had various ways of mixing rough-stuff, the rules below being as near right in general use as any:

For Rough-stuff.—Take equal parts of good japan and coach rubbing varnish. Pour together and add enough of the French umber filler to bring it to the consistency of a thin paste. Thin with thin turpentine.

For Priming and Lead Coating.—Use French umber filler. Mix with oil to the consistency of keg white lead, and use the same as lead.

For Putty and Glazing.—Mix with japan and varnish to the consistency required.

A harrow-shaped flock of wild geese, the Waterbury (Conn.) *American* says, went northward over the city recently. They seemed to attend sharply to the business of traveling until they spied one of the numerous kites the boys in the northern portion of the city were flying. This kite was uncommonly high in the air, and the geese objected to it. At least they circled about it two or three times, and then four of their number, delegated for the purpose, attacked the kite and tore it into shreds, and went on their way.

Mr. E. L. Corthell, chief engineer of the Atlantic and Pacific ship railway project, of which the late Captain Eads was the head, announces his determination to do all in his power to bring it to a successful conclusion. All who have known of Mr. Corthell's work in connection therewith, his unceasing efforts before Congress, certainly have faith in Mr. Corthell's ability to construct the work. He is well and favorably known in connection with this project, as well as his construction of the jetties in the South Pass, and other engineering plans with which Mr. Eads was identified.

Mr. Corthell has entered into a copartnership with Mr. Geo. S. Morrison as consulting and constructing engineers, with offices at 35 Wall Street, New York City, and Lasalle Street, Chicago, and will direct construction of railroads, examine, report, and take charge of river and harbor improvements for government or corporations. This will in no way, says our informant, interfere with the ship railway project, in which Mr. Corthell is interested with an enthusiasm second only to that of the late great inventor of the vast enterprise.

A country hotel proprietor, who had advertised for city boarders, was astonished the other day at receiving a letter from a New York gentleman asking him to send him samples of his drinking water for analysis. It was a wise precaution on the part of the man seeking a summer home, for a great deal of sickness arises from contaminated water; and if every one seeking country board for their family would make similar investigation respecting the sanitary condition of the places they are inclined to occupy, a twofold benefit would be the result—sickness in his own family would likely be avoided, and the boarding-house keeper would be necessitated to put his premises in cleanly condition.

A writer says that female canker worms have not the power of flying, and can only reach the extremities of limbs, on which they deposit their eggs, by crawling up the trunk. They begin this with the first warm days of spring, before buds and leaves are ready to put forth. It is quite common for them to do this while the nights are cold enough to harden tar in vessels around the trees intended to obstruct their progress. This old method has therefore given way to spraying the trees with water in which London purple or Paris green has been dissolved, thus killing the worms after they begin to eat. It requires very little poison to do this, two teaspoonfuls of poison to a barrel of water being sufficient. Too strong a dose might injure the apple leaves, which when young are very tender.

Mr. Thomas A. Edison, the famous electrician, has a very handsome residence in Llewellyn Park, Orange, N. J., and he is about to erect outside of the park a three story brick building, 250 × 60 feet, for conducting his experiments and as a repository for his books, drawings, models, etc. When completed, it will undoubtedly be the finest building devoted to electrical science in the world.

Wood and Iron says that one of the neatest and best ways of testing the soundness of a boiler plate is to sling it up by the corners so that it will lie in a horizontal position, and scatter a small quantity of dry sand evenly over the surface. By tapping the sheet lightly underneath, the sand will be thrown off wherever the plate is solid, while in places where lamination or blister occurs the sand will remain fixed.

Wrought iron expands and contracts with a force of about 200 pounds per square inch for each degree Fah. This property was taken advantage of at the Museum of Arts and Trades, in Paris, to draw in the walls of a gallery that had bulged outward by the weight on the arch. A number of bars were placed across the building and screwed into plates on the outside. Alternate bars were then heated, and when expanded were screwed up tightly, when the cooling and contraction of the bars drew the walls closer together. By repeating the operation the walls were brought into their original position.

The Burning of the Museum of Confucius.

A conflagration which took place lately in a remote village of China has destroyed one of the most remarkable literary and artistic museums in the world. The edifice in question was the ancestral home of the family of Confucius, built centuries ago, near Loo, in the province of Shan-Tung. In this building, generation after generation, the male heirs of the great Chinese teacher have dwelt in an unbroken line for 2,500 years, bearing the title of dukes. With every other family in China, a nobleman's rank must always be lower than that of his ancestor; for no true Confucian would presume to stand higher than his grandfather, father, or his elder brother. In the illustrious "House of Confucius," however, the lofty title of duke passes unchanged except when emperor after emperor adds by royal decree some new phrase of honor to the name and line of the famous philosopher. The tomb of Confucius is a huge mound, overgrown with trees, on the banks of the River Sze, with carved animals on each corner and groves of cypress trees ranged solemnly around. The relics of his age, and the rich tributes of worship paid to him by generation after generation, since 600 B. C., have all been gathered into this "House of Confucius," lately destroyed. Here were accumulated precious texts on stone and marble and commentaries of his books, wonderful carvings in jade and alabaster, jars and vases of porcelain, beyond all price, to say nothing of jewels and gold and silver work sent from all parts of the Celestial Kingdom, and even by reverential "outer barbarians." All, or nearly all, of these treasures are forever lost by this deplorable event, which has fallen upon China as nothing short of a national calamity. No liberality on the part of emperor or people can replace the vanished memorials of that remarkable teacher.—*London Telegraph.*

Spectroscopic Reaction in Gases.

At the suggestion of Sir Henry Roscoe, Mr. T. W. Best has made an interesting series of experiments on this subject, which has recently been communicated to the Manchester Literary and Philosophical Society. The author mixed the pure and perfectly dry gases in eudiometers provided with aluminum electrodes, which were connected with an induction coil and Leyden jar. The light of the discharge was then focused upon the slit of a one-prism spectroscope. The only gases experimented upon were hydrogen, nitrogen, and oxygen, but it may be hoped that others will shortly be examined. When nitrogen is added to hydrogen at ordinary atmospheric pressure, the least quantity of the former element that can be detected is 1·1 per cent. At the same pressure as little as 0·25 per cent of hydrogen can be detected in nitrogen. This curious difference is also observed with mixtures of nitrogen and oxygen. As little as 0·8 per cent of nitrogen can be detected in oxygen, whereas not less than 4·5 per cent of oxygen gives a visible spectrum in nitrogen. At lower pressures the results are somewhat different, the least quantity of nitrogen perceptible in hydrogen being, at ten inches and a half, 3·6, and at three inches and a half 2·5. The experiments are well worth extending. The limits of delicacy with gases containing carbon would be very interesting.

A Microscope Showing Perspective.

Mr. Burch has recently exhibited to the Royal Society of Great Britain a microscope of his invention, which, instead of being focused merely for the plane of the object to be examined, gives the perspective of the latter's different parts. All those who have looked into a microscope will appreciate the value of this improvement.

Mr. Burch discovered, in 1874, that if the distance of two lenses from each other is equal to the sum of their focal lengths, the optical conditions become such that the size of the images is always proportional to that of the objects, whatever be their position on the optical axis.

This proportion is in direct ratio of the focal length of the two lenses. A displacement of the object upon the optical axis brings about a displacement of the image in the same direction, but which is to the first as the square of the ratio.

He has constructed a microscope on this principle, and has exhibited to the Royal Society a magnified moss shown in perspective. The field of this first instrument is quite small, but Mr. Burch points out a means through which he hopes to enlarge it sufficiently. —*L'Industrie Moderne.*

The Use of Chloride of Palladium Paper in Detecting Gas Leakages.

To search for leakages of gas, Dr. Bunte suggests the use of paper dipped in palladium chloride solution. Such a paper, in fact, changes its color as soon as it is in the presence of a quantity, however small, of gas, coming from leaks imperceptible by the odor, and which produce no effect upon the earth covering the pipes. Dr. Bunte suggests the following method of practically applying the test to street mains. Above the pipe are excavated, at intervals of 2 to 3 meters (6½ to 10 feet), holes 30 to 40 cm. (12 to 16 inches) deep, corresponding to the joints and sleeves. In each opening is placed an iron tube 12 to 13 mm. (½ inch) in diameter, within which is a glass tube containing a roll of the test paper. The air from about the main enters the iron tube, and the trace of gas which may be present reveals itself by coloring the paper brown or black, according to its quantity. If after ten to twenty minutes the paper is still white, we may be certain that at the point tested there is not the smallest escape of gas. Various authorities who have experimented with Bunte's method certify to its efficacy. Beyer, of Mannheim, Eitner, of Heidelberg, Richard, of Carlsruhe, the superintendent of the gas company of Stuttgart, may be noted among these. As a consequence of the trials made at Monaco, it follows that if the use of palladium paper is of incontestable use for testing outdoor conduits, it is of no less value in the case of leaks occurring within houses.

Dr. Bunte admits this fact, but adds that in applying this reaction to places closed tightly, certain troubles present themselves. Thus, suspending a piece of paper saturated with palladium chloride to the ceiling of a gas-lighted room, only a small fraction of the air comes in contact with it. Now, to produce the coloration, a certain volume of gas is required. It follows that gas must form a considerable portion of the atmosphere to act upon the paper. Better results would be obtained by aspirating the gas through tubes containing it. Another trouble is that the paper suspended in the air dries and becomes less sensitive. Felker overcomes this trouble by placing under the glass tube a receptacle filled with palladium solution.—*L'Industria.*

Pietsch's Sewer Pipe Trap.

Under the head of "Something New in Traps," the Brooklyn *Eagle* of May 14 says:

"Mr. Herman Pietsch, of 360 Fulton Street, the inventor of a wash bowl trap for which he claims peculiar merits, exhibited his apparatus in the health department laboratory this morning. There were present Dr. Kent, Dr. Elias H. Bartley, and Inspector Coggins, of the Plumbing Bureau. All these gentlemen expressed their opinion that Mr. Pietsch's invention was far ahead of anything which had yet been placed before the public."

We may add this trap has been in use in the SCIENTIFIC AMERICAN office for two or three years, and gives the utmost satisfaction.

Whetstones.

The *Guide Scientifique* describes the following method of making artificial whetstones: Gelatine of good quality is dissolved in its own weight of water, the operation being conducted in a dark room. To the solution 1½ per cent of bichromate of potash is added, which has previously been dissolved in a little water. A quantity of very fine emery, equal to nine times the weight of the gelatine, is intimately mixed with the gelatine solution. Pulverized flint may be substituted for emery. The mass is moulded into any desired shape, and is then consolidated by heavy pressure. It is dried by exposure to strong sunlight for several hours.

THE PARIS INTERNATIONAL EXHIBITION.

The crowning triumph of the French republic, reserved for the centennial anniversary which changed the destinies of the great nation, and gave liberty and license to her children, will be worthy of France and of the occasion the country feels called upon to honor. There are still two years to pass before the Great International Exhibition of 1889 will be opened to the public, but they will be all too short to complete the vast scheme which has been evolved from the numerous plans submitted for consideration, and which is now being pushed forward with the system and zeal which distinguish the organization and energy always characteristic of great public undertakings in France. As will be seen from the perspective view and general plan we publish this week, the exhibition buildings will occupy the whole of the Champ de Mars, the quays on each side of the river, and the extensive grounds of the Trocadero and the Palace itself. The most striking feature of the exhibition will be the great Eiffel Tower, nearly 1,000 ft. in height, opposite to and axial with the Trocadero Palace and the Port de Jena. At the other end of the Champ de Mars, and extending for its whole width, will be a vast hall, covered with an arched roof about 350 ft. span, to be devoted to machinery. Adjoining this will be a vast building for miscellaneous groups, and on either side will be two great halls, one devoted to art and the other to industrial exhibits. What space is not covered in will be laid out in gardens. The general arrangement of the buildings will, therefore, be on three sides of a square, the fourth side being occupied by the stupendous monument, which it is reasonably expected will be a source of astonishment and attraction to visitors. A committee has been appointed to assist the commissary-general and the director of sections, to attend to everything relating to electrical matters. The president of this committee is M. Mascart, and it is divided into four sub-sections charged to examine all the questions relating: 1. To electric lighting. 2. Generators and electrical machines. 3. Tests and measurements. 4. Telephones, telegraphs, etc. The first sub-committee, under the presidency of M. Lemonnier, had first to consider two fundamental questions: Shall the exhibition be lighted every evening, and what spaces shall be lighted? Naturally, the first question was promptly answered in the affirmative. It was indeed considered possible that such a course might be objected to on the ground that theaters, concerts, and other places of public resort might suffer, but, on the other hand, it was obvious that, during the time of the exhibition, Paris would be so crowded with visitors as to secure ample audience for every species of entertainment. Moreover, electric lighting will be undoubtedly one of the great attractions to exhibitors who could only get justice after dark. In order to arrive at an approximate estimate of cost, it was indispensable to describe what portion of the exhibition should be lighted. First the Trocadero Palace might be thrown out of consideration, as it will be lighted by gas. The question of illuminating the Eiffel Tower is also held in reserve. The portions of the exhibition opened to the public at night will be limited to the terraces, the art galleries, the industrial exhibition, the agricultural exhibition, the machinery hall and approaches, as well as the restaurants and offices. The areas of the various surfaces to be illuminated are as follows:

1. *Open Spaces.*	Square meters.
Gardens	188,810
Courts outside machinery hall	17,075
	205,885

Or about 2,213,000 sq. ft.

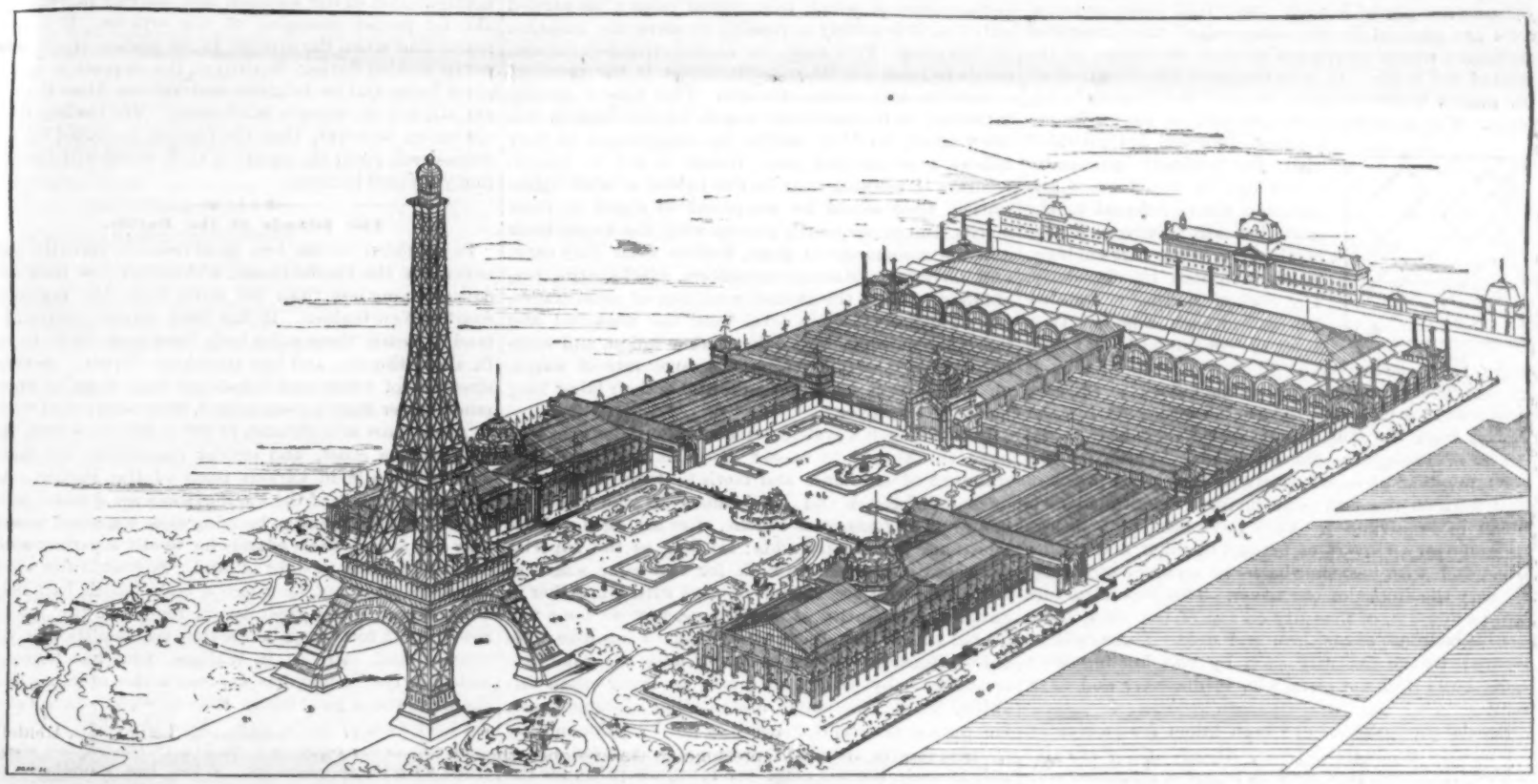
2. *Covered Surfaces.*	
Machinery hall	63,000
Central gallery	5,250
East and west galleries	7,200
Offices, etc.	900
	76,350

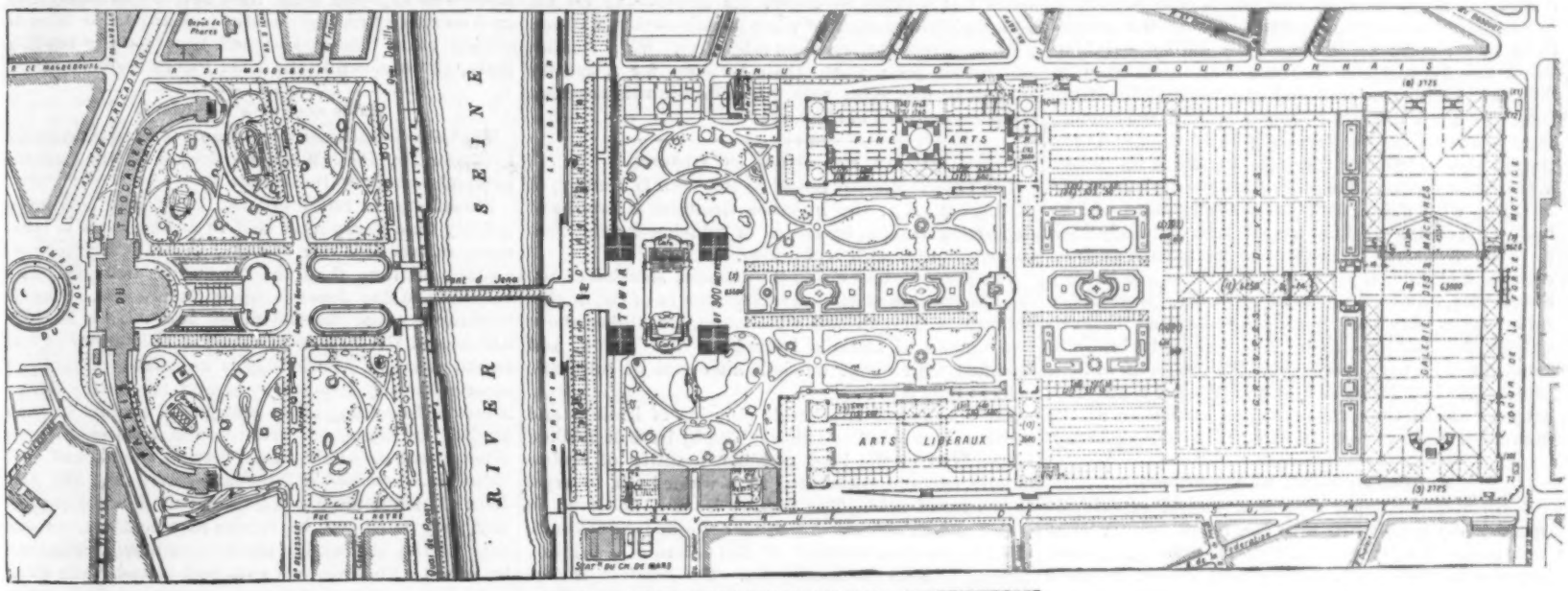
Or about 818,700 sq. ft.

Besides the foregoing, there will be at least 184,000 square feet for the industrial and art galleries, restaurants, etc. An approximate estimate shows that some 3,000 horse power will be required to produce the necessary light of 3,000,000 candles.

Under the auspices of the syndical chamber of electrical industries, a syndicate has been formed for undertaking this great work. This syndicate, which includes among its members the leading electrical engineers in Paris, has offered to furnish the material, and to furnish light at all the private and public parts of the exhibition that will be open at night, on their own responsibility. Other French and foreign exhibitors will, however, be invited to aid the syndicate with engines, dynamos, and plant. The remuneration of the syndicate will consist: (1) A payment of one franc for each evening visitor, the entrance charge being fixed at two francs; (2) a tariff to be paid by private users; this tariff to be fixed by the administration.

It is not too much to say that the success of lighting the 1889 exhibition will be assured, thanks to the initiative taken by the Paris manufacturers of electrical plant, who, to the number of six, have undertaken the responsibility.



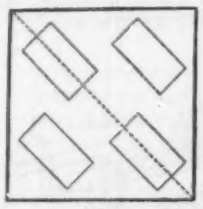


THE PARIS INTERNATIONAL EXHIBITION.

THE EIFFEL TOWER.

As soon as the construction of the Eiffel Tower in connection with the Paris Exhibition of 1889 was decided on, the works were commenced and pushed forward with so much activity that very shortly the first portion, that is, the foundations of the four columns forming the base, will be finished, and it will be of interest to describe them before they are covered up out of sight. As is well known, the tower, 984 ft. in height, will rest on a base occupying a square, and be carried by four steel columns, supported on masonry piers, 328 ft. apart from center to center. The axis of these foundations coincides with that of the Champ de Mars, and their sides are perpendicular to the Seine. They occupy the site which since the 1878 exhibition had

been utilized as a garden. The two masonry piers nearest to the Seine are in ground which the old maps of Paris indicate as having been occupied by an arm of the river, so that there is no wonder that the excavations revealed the presence of water a short distance below the surface. The further piers, on the contrary, rest in firm gravel, entirely free from water. On this account different methods had to be followed in constructing the foundations of the two sets of piers. Those nearest the Seine are being formed with caissons sunk by compressed air. The ground over the whole surface of each pier was first removed to a slight depth, and then at the bottom of this rectangular excavation were placed four large wrought iron caissons 49 ft. 3 in. long by 19 ft. 8 in. wide and 10 ft. high. About 6 ft. above the bottom of the cassion a platform or roof was made, carried on a series of girders 18 in. deep. These caissons are placed in such a way that their principal axes are parallel to the diagonal of the excavated rectangle, which converges toward the center of the base of the tower. It is in the same direction that all the angles of the structure lie, and the thrusts be exerted. The cassions thus arranged, as shown in the annexed diagram, are provided with the ordinary pneumatic appliances on the floor of the partition above referred to, the space beneath serving as a commodious working chamber, which is lighted by electricity. The work of sinking is done by ten men in each caisson. It is kept up continuously day and night, and a daily average progress of 15 in. or 16 in. is made. The ultimate depth of the bottom of the caissons is 82 ft. 9 in. below the ground level. At the end of last week the four caissons of the piers nearest the center of Paris were almost erected. Those for the corresponding piers are nearly in their final position. The work on the two piers furthest from the Seine is much more advanced. They have been built on the ground over an invert of beton 6 ft. thick, and are finished each with four skewbacks at an angle of 52 deg. to carry the arches of the tower. The superstructure will rest on 3 ft. of masonry on top of the piers, and a double bedplate of cast iron and steel. These will be secured to the masonry each by two holding-down bolts built into the piers, 4 in. in diameter and 23 ft. long.



Special precautions have been taken for passing off harmlessly underground the atmospheric electricity which will accumulate on this gigantic lightning conductor. A commission of electricians was appointed to consider this question, and to point out the precautions that should be taken. They consist in sinking below the foundations ten cast iron tubes 20 in. in diameter, which are connected with the metallic structure. In a few days the ground around the foundations furthest from the Seine will be filled in, and only the skewbacks to carry the framework will be visible. When the caissons of the other piers are sunk they will be filled with beton, and the masonry base will be built upon them. Nothing has yet been definitely fixed as to the elevators. There will be one in each inclined column, and from a level of 490 ft. there will be only two, which, however, will work vertically. Several different types have been under consideration. It is calculated that the pressure of the tower on its base will be about 57 lb. per square inch. The effect of wind is allowed for in this estimate at about 33 per cent. It is also calculated that the maximum oscillation at the summit of the tower will not exceed 7 in.—*Engineering.*

Tuning an Organ by Telephone.

A Birmingham paper says that a novel experiment was recently tried there with the telephone. A letter was received by Messrs. Rogers & Priestly, musical caterers in that town, asking them to send an organ to suit a pianoforte to a room at Moseley, where a concert was to take place that night. The firm were totally at a loss to know the precise tone of the piano, and consequently despaired of being able to comply with the demand in time. However, much to their surprise, they found that they could communicate with the people at Moseley through the telephone. Forthwith Messrs. Rogers asked that one of the notes of the piano should be struck. When this was done, the sound could be distinctly heard in Colmore Row, and by gradually reducing the pitch pipe the tones of both instruments were made to correspond.

Hypnone.

Von Schuder writes of fourteen patients treated by acetophenon, or hypnone, in whom favorable results followed. A dose of from 2 to 4 drops was sufficient to produce sleep of several hours' duration. The effect was especially happy among the phthisical.

No ill after-effects were observed. In one case only, after 6 drops had been given, the patient awoke from a long sleep with headache and slight vomiting. The effect, dependent upon the dose and the individual peculiarities of each patient, was manifested after from one-half to one and one-half hours.—*Der Pharmaceut.*

Incentives to Better Work.

One of the strongest inducements the mechanic can see in striving to learn to do work better and quicker is the prospect of increased wages. While to a certain extent there may be a desire to excel, yet if there is no particular profit in excelling, the principal inducement is gone. It is of course sometimes difficult, where large numbers of men are employed, to grade them so that justice will be done to all. Employers recognize this fact, yet it can be done. Where men are working under the piece system, the better workman gets pay at least for his ability to do more rapid work. And here, too, comes one of the worst difficulties with labor unions or organizations. They to a certain extent have the same question to deal with. Where men are paid by the piece, the difficulty is apparently overcome. But there are so many kinds of labor in the performance of which this system cannot be carried out, that it is utterly impossible to solve the question by this plan. To a class one of the strongest inducements to joining a labor organization is the prospect of securing an increase in wages. This class is greatly benefited, in the matter of wages, by membership in a labor union, for they receive the same wages as their fellows, provided the piece system is not in vogue; whereas if working outside the pale of a labor organization, they would be compelled to stand on their merits, and consequently put up with the wages their abilities command—in short, receive what they earn, and no more. Masons, carpenters, blacksmiths, machinists, in fact the skilled workmen of most trades, place themselves on a level with the unskilled and incompetent when they join a labor union, and without the piece system receive the same rate of wages, no matter how much more profitable their labor may be to the employer.

Does not such a system tend to discourage men who have the ability to excel? Does it not lower the standard of excellence and merit? Does it not produce indifference and carelessness in the ranks of labor? The *Industrial Gazette*, after asking the above questions, pertinently adds: So long as the superior workman is obliged to work for the same wages as other men who are unable to cope with him either in quality or quantity of work done, just so long will he fail to see the object of striving to improve. He is not benefited by the union, because the wage rate established by fellow members is lower than his ability would command under other circumstances. He pays a penalty for being a good workman, and membership in the union entails pecuniary loss. Not only himself, but his employer is injured also, for the latter has a right to expect his employe to do his best, which he cannot do when conscious that a slouch workman receives the same rate of pay for a smaller amount of poor work than he does for a greater amount of first class work. A reform in this direction is the crying need of the hour.

Electro Deposition of Iridium.

In a patent recently issued to Mr. Wm. L. Dudley, of Covington, Ky., the inventor describes a process of depositing iridium, by means of which a bright, flexible reguline deposit is obtained.

The inventor uses either an aqueous solution of the double chloride of iridium and sodium or of the double chloride of iridium and ammonium, containing about two ounces of metallic iridium to the gallon, and acidified with about one-half an ounce of sulphuric acid to the gallon.

The solution of the double chloride of iridium and sodium is prepared as follows: The hydrate of iridium is dissolved in the least possible quantity of hydrochloric acid and evaporated in a water bath to expel the excess of acid. The residue is then dissolved in water and an amount of sodium chloride is added sufficient to combine with all of the chloride of iridium present to form the double salt. The solution is then diluted to the required amount, so as to contain about two ounces of metal to each gallon of liquid. The required amount of sulphuric acid is then added, and the solution is ready for the electro deposition.

The solution of the double chloride of iridium and ammonium is prepared as follows: The hydrate of iridium is dissolved in the least possible quantity of hydrochloric acid and carefully neutralized with ammonium hydrate. It is then acidulated with sulphuric acid until all of the precipitate produced by the ammonium hydrate is dissolved, and finally diluted with water until each gallon of the liquid contains about two ounces of the metal. The solution is then ready for work when acidified, as before mentioned.

From both of these solutions Mr. Dudley obtained a thick, bright, and reguline deposit of iridium; and he has found that a plate of iridium or phosphide of iridium, as made by the Holland process, if used as an anode, will dissolve in these solutions while the current is passing.

As in electro plating with other metals, it is essential, to obtain good results, that the articles to be plated should be perfectly clean. A brighter and smoother deposit is obtained if the articles are highly polished before they are introduced into the iridium bath. In plating articles which are readily attacked by the solution, it is of course desirable to first coat them with some metal not appreciably affected by such solutions.

In the deposition of iridium from any of its solutions it is necessary to avoid battery power of too great intensity; and in case the intensity be too great, it can be recognized by the deposit becoming dark and powdery, and also by an excessive evolution of gas from the surface of the anode and cathode. In managing the solution, alkalinity should be avoided, although neutral solutions may be employed; but acid solutions are to be preferred.

During deposition, where a thick deposit is required, it may be found necessary to remove the articles from the solution from time to time, and to wipe them in case the deposit should have a tendency to become black; but this blackness may be avoided by proper manipulation of the solution and battery power, and also by proper cleansing of the articles. It is also found that when the articles to be plated are kept in gentle motion during deposition, the deposit will take place faster and be brighter and thicker than if they are allowed to remain stationary. Mr. Dudley does not claim, however, that the plating produced by his process will resist the action of acids which will dissolve finely divided iridium.

The Islands of the Pacific.

In addition to the two large islands recently discovered in the Pacific Ocean, a third has just been discovered lying less than 100 miles from the northern coast of New Guinea. It has been named Allison Island, is nearly three miles long, rises from 100 ft. to 150 ft. above the sea, and has abundant timber. Several stretches of fertile and inhabited land, some of them much larger than Allison Island, have been found within a few years at a distance of 200 or 300 miles from the New Guinea coast, and similar discoveries are made once in a while in various parts of the Pacific. Although the maps of the Pacific Ocean are studded with islands which appear to be lying close together, vessels may sail among these islands for weeks together without once coming in sight of land. So vast is the waste of waters, that not long ago a crew which had been shipwrecked in the great island region of the Pacific rowed north forty days before they reached Hawaii, the nearest land. Mr. A. R. Wallace, who has traveled widely in the Pacific, has expressed the opinion that there are still a good many islands which have never yet been seen by white men. Now and then a Pacific trader finds some new or little known island, and opens trade with its inhabitants. When the Woodlark Islands were explored some time ago, it was found that an Australian firm had carefully charted the islands several years before, and had been quietly trading there, all unknown to the other Pacific merchants.

Basic Slag as a Fertilizer.

The following matter is the result of investigation by Professor Dr. Paul Wagner, director of the agricultural laboratory at Darmstadt:

Phosphate in finely crushed basic slag acts more quickly than phosphoric acid in crude guano or bone meal, notwithstanding the slag contains a larger percentage of lime than the other two manures. The value of the slag depends upon its fineness. Slag I. is reduced equal to the finest flour; II. is slightly less so, and III. is twice as course as II., yet barely one fourth as active. Basic slag is especially valuable on moor and peaty meadow soils, and the author deems it unwise to use any other phosphate manure on such earths. In laying out pastures and meadow, the slag gives great help when placed deep in the ground, and its use is advocated in vineyards, orchards, and gardens. If ammonium sulphate be used additional to slag, they must not be strewn as a mixture, as the lime in the slag would liberate ammonia. Slag can be mixed with nitrate of soda and potash salts without deterioration; but to prevent adhesion from standing unused, powdered peat must be added. The iron in the slag is not at all deleterious.

Preservation of Wooden Poles.

A simple method of treating wood with preservative solutions is employed in Norway for telegraph poles. After the poles are set in place a man goes from one to another with an auger, with which he bores a hole in each post, beginning at a point about 2 feet above the ground, and boring obliquely downward, at as small an angle as possible with the axis of the post, until the point of the auger reaches the center of the stick. The auger hole should be an inch in diameter, and, in telegraph poles of the ordinary size, will hold easily 4 to 5 ounces of sulphate of copper, which is put into it in the form of coarsely powdered crystals, and the opening then stopped with a plug, the end of which is left projecting as a handle, so that it can be pulled out and replaced. It is found that the crystals of copper sulphate disappear slowly, so that every three or four months the charge must be renewed; while the wood, both above and below the auger hole, even to the very top of the pole, gradually assumes the greenish tint due to the presence of copper in the pores.

ENGINEERING INVENTION.

A dumping car has been patented by Mr. Augustin C. M. Auguin, of Raincy, near Paris, France. Combined with a truck having transverse shaft with a worm, and the laterally movable body with a transverse rack on its under side engaging the worm, are hooks and gudgeons for limiting the outward movement and forming the axis on which the body turns in dumping, with other novel features, to enable the bodies of cars to be displaced in either direction laterally.

AGRICULTURAL INVENTIONS.

A check rowing attachment for corn planters has been patented by Mr. Orren A. Shotts, of Osceola, Iowa. It is an attachment capable of being elevated bodily from the ground and adjusted laterally and by rotation, the drop being automatically operated by the action of the check wheels, the invention covering various novel features of construction and combination of parts.

A plow has been patented by Mr. Edward B. James, of Thomasville, Ga. It may be arranged as a double plow, or two single plows adjusted to plow two furrows of different depths simultaneously, or it may be used as a cultivator, having two plow beams and adjustable fastening devices for connecting them, with pivoted standards supported by offset braces, the handles having an adjustable support for holding them at different heights.

MISCELLANEOUS INVENTIONS.

A device for lowering coffins has been patented by Mr. John T. Meredith, of Buchtel, Ohio. This invention provides a means whereby the coffin may be supported over the mouth of the grave, and lowered therein, the apparatus being strong, cheap, and durable.

A post hole digger has been patented by Mr. James H. Humphrey, of Platte City, Mo. The machine consists of a grip, lever, disk rod, and disk, and is especially designed to remove the earth quickly from the digger, and when digging to assist it in retaining very wet or dry earth.

A line protector for vehicles has been patented by Mr. Frank C. York, of Salina, Kansas. It is intended to prevent the lines of the harness in driving from being caught under the ends of the thills, the thill ferrules having loops in which straps are fastened by snap hooks and by buckles to the collar.

A scarf attachment has been patented by Mr. Louis Fischer, of New York City. It is a combined neckband keeper and catch made from a blank of sheet metal, having a tooth or catch pin formed integrally therewith and folded to form a tubular guide for the band, the device being adapted to be secured to the scarf, stiffening and making a fastening for it.

A ditching machine has been patented by Mr. Archibald Stewart, of Keota, Iowa. It has a hollow cone with spiral slots, along the edges of which knives are arranged, an elevating screw or auger within the cone raising the earth cut away by the knives, the drawing forward of the machine over the ground simultaneously forming the ditch by a continuous operation.

A saw buck has been patented by Mr. Charles B. Guy, of Postville, Iowa. In combination with the ordinary form of saw buck are pivoted levers with curved upper ends, whereby the wood billets may be clamped in the crotch of the buck by an easy and natural movement of the sawyer's foot, and may be quickly released to shift the wood along the buck.

A show case has been patented by Mr. James H. Flagg, of Brooklyn, N. Y. It has a series of lower compartments, and an upper chamber having an inclined bottom and a glass or transparent cover, with a removable drawer in the upper chamber having a series of compartments, so that samples will be in full view of the purchaser and the salesman, but need not be disturbed to deliver goods.

An end gate for wagons has been patented by Mr. Munn Davis, of Wahoo, Neb. This invention provides a device occupying but little space, to facilitate the dumping of wagons and carts, dump cars for coal or ore, steam shovels, excavators and dredgers, the device being adapted to dump the load by a single movement, and while the apparatus to which it may be attached is in any given position.

A spring clasp for gloves has been patented by Mr. Siegmund Bernhardt, of New York City. It has two side pieces, with several holes for securing them to the glove at the placket, between the lining and the outer part of the glove, the side pieces being hinged by a pin at the point of opening, and one of the side pieces having attached thereto a flat pointed steel spring to hold the clasp closed or open, as desired.

A drawer has been patented by Mr. Joseph H. Knaus, of Fayette, Mo. The invention covers a combination by which an endless strand, of cord, wire, or chain, passes around pulleys at the front and rear of the casing, at opposite sides of the drawer opening, whereby the binding of the drawer in moving it in and out of its casing will be prevented, and the friction obviated.

A combined screen and storm door has been patented by Messrs. Louis Guthrie and William G. Baumgardner, of Filer City, Mich. In a door having a screen-covered opening there is a rabbeted moulding around three edges of the opening, a panel sliding in the ways formed by the rabbets of the moulding, while a fourth piece of moulding is secured to the outer edge of the panel and completes the border.

A filter has been patented by Mr. William T. Nesbet, of Schell City, Mo. It is intended as a rain water filter, by which the water from the roof is strained and filtered before entering the cistern, and has a vertically placed cylinder, within which is a smaller perforated cylinder, to act as a strainer, arranged above the filter proper, the arrangement being such that the strainer and filter can be readily cleaned.

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